VOL. V. NO. 3 DECEMBER, 1924

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1923

HONOLULU, HAWAII

PRICE 75 CENTS

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All correspondence should be addressed to the Secretary, Hawaiian Entomological Society, Honolulu, Hawaii, from whom copies of the Proceedings may be purchased.

Volume I of the Proceedings, for 1905-07 (in five numbers) contains 210 pages, 4 plates, and 5 text figures.

Volume II, 1908-12 (in five numbers), contains 311 pages, 7 plates, 5 cuts, and 1 portrait.

Volume III, 1913-17 (in five numbers), contains 500 pages, 8 plates, and 6 cuts.

Volume IV, 1918-20 (in three numbers), contains 610 pages, 10 plates, and 25 cuts.

Volume V, No. 1, 1922, contains 177 pages, 3 plates, and 25 cuts.

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PROCEEDINGS

OF THE

Hawaiian Entomological Society

VOL. V, NO. 3. FOR THE YEAR 1923. DECEMBER, 1924

JANUARY 4, 1923.

The 206th meeting of the Hawaiian Entomological Society was held at the usual place. Besides Vice-President Swezey, who presided, there were present the following members: Messrs. Bryan, Crawford, Ehrhorn, Fullaway, Giffard, Illingworth, Rosa, Whitney, and Willard. Mr. S. Issiki was a visitor.

The minutes of the last meeting were read and approved.

The Executive Committee reported the followng appointments:

P. H. Timberlake, Librarian and Custodian of Insects.

O. H. Swezey, Editor of the Proceedings for 1923.

Upon motion of Mr. Bryan, it was voted that the editor be authorized to accept or reject any paper presented for publication; and that all papers be typewritten and submitted in duplicate.

NOTES AND EXHIBITIONS.

Maruca testulalis Geyer.—Mr. Swezey exhibited a specimen of this Pyralid moth reared from a larva found in pod of garden peas December 9, 1922. Two of the larvae were found in a mess of green pea pods obtained from the Metropolitan Meat Market. Two larvae of *Lycaena boetica* were found in the same batch of pods. Both kinds of larvae were feeding on the green peas. One moth issued December 23, and one butterfly December 28. This Pyralid moth has not previously been noted here, though it has undoubtedly been present for some time. It is a moth which is widespread in India where, according to literature on Indian insect pests, it is a minor pest of pulses,

occurring also in *Dolichos lab-lab*, green gram, red gram, mung, moth tur, and probably wild Leguminosae.

Blabophanes crocicapitella (Clems.).—Mr. Swezey exhibited this Tineid moth reared from dead rat material. A large number of the moths had issued from a tin of soil containing the remains of a dead rat with which Mr. Illingworth was experimenting.

Setomorpha insectella Fab.—Mr. Swezey reported rearing this moth abundantly from larvae feeding in alfalfa meal, and also from the remains of a bale of alfalfa hay which had become partially decayed, Kaimuki, December 10, 1922. This is new data on the habits of this Tineid moth.

Bruchids in Koa seeds.—Mr. Swezey reported the breeding of *Bruchus limbatus* and *B. pruininus* from koa seeds, and stated that, so far as he knew, this was the first record of Bruchids from koa seeds, and that *B. limbatus* was more abundant than *pruininus*. He had collected pods from trees on Sugar Loaf Hill, to examine for injury to the seeds by Tortricid larvae. The examination of 120 pods collected from a height of twenty feet and having a possibility of 1285 seeds, contained 598 good seeds, or 45 per cent (a greater proportion of good seeds than usual); 545 seeds had been eaten by Tortricid larvae, or 42 per cent; 69 seeds, or 5 per cent, were attacked by Bruchids.

Bruchus sallaei on Maui.—Mr. Swezey reported having reared 26 of this Bruchid from 5 pods of *Acacia farnesiana* collected in a gulch of the Honokawai section of Pioneer Mill Co., several miles north of Lahaina, December 5, 1922. Many eggs were on the pods at time of collecting, and the Bruchids issued December 11 to 31. Four parasites, *Heterospilus prosopidis*, also issued. Apparently, this is the first record of the occurrence of this Bruchid on the Island of Maui. It is abundant there, as shown by the pods collected, and the other pods on the bushes of the locality.

Plochionus timidus Hald.—A specimen of this Carabid beetle and its larvae were exhibited by Mr. Swezey. Three of the beetles were collected by him on a *Pandanus* tree at Paia, Maui,

December 8, 1922. There were Tineid larvae among the debris of dead leaves. It is probable that the beetle and its larvae were feeding upon these. This is the first record of this species in the Islands. It occurs throughout the United States, and is closely related to *Plochionus pallens* which has been collected in houses in Kaimuki by Timberlake and Swezey.

Pleistodontes imperialis Saund.—Mr. Swezey reported this fig-wasp now very well established. The large tree of *Ficus rubiginosa* on the old Tantalus road above Makiki Heights, in December, produced a very large crop of fruit (a twig containing a dozen fruits being exhibited) due to the presence of the fig-wasp. An indication of the abundance of the insect is shown by the examination of one fruit which contained 85 (61 females and 24 males) of the fig-wasps, already matured, but had not issued from the galls where they developed. The fruit also contained 155 good seeds.

Mapsidius quadridentata Walsm.—Mr. Swezey exhibited a specimen of this moth, which issued from a cocoon found by him on a leaf at 2000 feet elevation, Wailuku, Maui, December 9, 1922. The position where the cocoon was found indicated that the larva had fed on *Charpentiera* leaves just as do the other species of this genus. It was described originally from a single specimen from Lanai.

Supella supellectilium (Serv.).—A specimen of this roach was exhibited by Mr. Swezey, who had taken it in the Pioneer Hotel, Lahaina, Maui, December 5, 1922. It is the first record of the occurrence of this roach on Maui. It was first collected by Timberlake in Kaimuki about May, 1921.

Cyrtorhinus mundulus (Bredd.).—Mr. Swezey reported finding this bug established in a leafhopper-infested field at Lahaina, Maui, December 5, 1922. As no colony of the bug was placed on Maui when it was introduced from Australia two years ago, it has reached Lahaina by its own efforts, probably from Ewa Plantation, where it was very abundant during the early summer of 1922. It is a considerable distance (seventy miles or more) for a small insect to make its way over seas, and indicates their ability to do it in some way or other.

Carpophilus sp. in Macadamia Nut.—Mr. Fullaway reported an infestation of macadamia nuts by Nitidulid larvae which proved, on rearing the larvae to adults, to be a species of *Carpophilus*. The nuts were not perfect, and it is probable that the beetles were attracted by the rancidity of the meat.

FEBRUARY 1, 1923.

The 207th meeting of the Hawaiian Entomological Society was convened at the usual place at 2:30 p. m. Vice-President Swezey presided. Other members present were Messrs. Bissell, Bryan, Ehrhorn, Fullaway, Giffard, Rosa, and Willard.

The minutes of the previous meeting were read and approved.

NOTES AND EXHIBITIONS.

Rhodesiella elegantula Becker.—Mr. Bryan exhibited three specimens of this Chloropid fly, which were captured by Mr. Swezey in Palolo Valley, December 24, 1922. The species is shiny black, with a long triangular scutellum, the thorax and scutellum being covered with light yellow-brown hairs. The legs are yellow-brown, and the last tarsal joint darker. Specimens have been captured near Waimea, Hawaii. This is the first record for Oahu.

A Weevil Near Scyphophorus acupunctatus Gyll.—Mr. Bissell exhibited one specimen of a weevil, very closely resembling this sisal borer, which was collected in Honolulu, June 1, 1922. This specimen may have been brought in with pods of *Acacia farnesiana* from Ewa coral plain near an old sisal plantation. One specimen of this weevil was collected by Mr. Muir at the H. S. P. A. Experiment Station in December, 1918.

An Anthribid New to Hawaii.—Mr. Bissell exhibited one specimen of an Anthribid, previously unrecorded in Hawaii, which was collected on a window at the Vida Villa Hotel, Honolulu, January, 1923.

Winged Form of Zorotypus swezeyi Caud.—Mr. Fullaway exhibited a specimen of the winged form of *Zorotypus swezeyi*

(Order Zoraptera) collected at Kokee, Kauai, in a rotten log during July, 1922.

Lysiphlebus sp. from California.—Mr. Fullaway exhibited a specimen of a California species of *Lysiphlebus*, parasitizing the cotton aphis, *Aphis gossypii*, the bean aphis, *Aphis medicaginis*, and the wild coffee aphis, *Toxoptera aurantiae*. This parasite has been sent in numbers by Mr. Timberlake from Whittier, California, for colonization here.

Cyrtorhinus mundulus (Bredd.).—Mr. Swezey reported collecting this introduced bug on *Sporobolus* grass on the beach near Barber's Point, Oahu, January 7, 1923. On the grass was the leafhopper *Kelisia sporobolicola*, and presumably the bug was feeding on the eggs of the leafhopper. This is the first observance in Hawaii of this bug living on or being associated with other leafhoppers than the cane leafhopper. It was observed two miles from a cane field of Ewa Plantation.

Enicospilus dispilus Perk.—A specimen of this *Ophionid* was exhibited by Mr. Swezey, collected by him at Wailuku, Maui, 2000 feet, December 9, 1922. Apparently, it is the first record of it from that island.

Caloteleia elegans Perk.—Mr. Swezey exhibited a female of this beautiful Scelionid collected by him in a cane field at Lahaina, Maui, December 5, 1922. The type was collected at the Experiment Station H. S. P. A., Honolulu, in 1905, by Dr. Perkins, who considered it an immigrant. Apparently, this is the first record of it from Maui.

Casinaria infesta (Cress.).—Mr. Swezey exhibited a specimen of this Ophionid reared from *Phlyctaenia stellata*. Several caterpillars were collected on *Pipturus* on the Manoa Cliff trail on Mt. Tantalus, January 10, 1923. Only two of the caterpillars lived to spin up, and from each of these one of this parasite issued fourteen days later. This is an additional host for this parasite, and indicates its spread to the mountains. It is an immigrant that was first observed in Kaimuki in February, 1921.

Protoparce quinquemaculata blackburni (Butl.).—Mr. Swezey exhibited three fine specimens of this Sphingid moth which he

had reared from caterpillars collected on *Nicotiana glauca* at Specklesville, Maui, December 8, 1922. The caterpillars had obtained their growth and entered the soil for pupation on December 13, 14, and 16, respectively. The moths issued just forty-one days later in each instance, i. e., January 23, 24, and 26, respectively. Although this moth has been known for a long time, having been collected by Blackburn, yet the caterpillars are rarely met with, *Nicotiana glauca* apparently being its favorite food plant, although it was reported as occurring on cultivated tobacco, when this was being grown at Kona, Hawaii, a few years ago. Hitherto, the only specimen of the moth in any collection in the Territory has been a single one in the H. S. P. A. collection, reared by Mr. Swezey from a caterpillar collected on *Nicotiana glauca* at Kahului, Maui, October 10, 1919. From the present lot of specimens, he intends distributing one each to the Bishop Museum and the Board of Agriculture and Forestry.

MARCH 1, 1923.

The 208th meeting of the Hawaiian Entomological Society was held at the usual place, with President Muir in the chair. Other members present were Messrs. Bissell, Bryan, Crawford, Fullaway, Giffard, Illingworth, Rosa, Swezey, and Willard.

The minutes of the previous meeting were read and approved.

PAPERS.

"Hawaiian Trypetidae."

BY E. H. BRYAN, JR.

"Notes on Coccinelidae."

BY D. T. FULLAWAY.

"The Small Banana Weevil."

BY J. F. ILLINGWORTH.

"Whence the Termites of Hawaii?"

BY THOMAS E. SNYDER.
Entomologist, Bureau of Entomology, United States Department of Agriculture.

NOTES AND EXHIBITIONS.

Hippobosca equina Linn. in New Hebrides. — Mr. Bryan exhibited two specimens of this horse louse-fly which were

among a small collection of flies received at the Bishop Museum from Mr. E. Robertson, Tanna Island, New Hebrides. It is sometimes called the "winged horse tick" of Europe, and has also been recorded by Loew from North America, according to Aldrich's Catalogue.

Rhodesiella tarsalis Adams.—Mr. Bryan noted that the series of specimens in the H. S. P. A. collection marked "Rhopalomeiidae, Rhinotora?" from Tantalus, Oahu, 6-19-21 (Swezey), Grove Farm, Kauai, 3-2-17, Honolulu, VII-1-16 (Ehrhorn), "observed on leaves infested with *Pseudococcus nipae*," and on window 4-23-14 (Swezey), belong to this species, as does also a single specimen of this fly collected by Giffard on the window at his home January, 1923.

Phormia regina Meigen.—Mr. Bryan stated that this fly had been recorded from Hawaii by Dr. L. O. Howard (Proc. Ent. Soc., Washington, IV, p. 490, July, 1901), but that its occurrence here was questioned by local entomologists. In reply to his inquiry concerning this fly, Dr. Aldrich wrote as follows January 19, 1923:

"On looking at our collection I found three female specimens, two collected by H. W. Henshaw in 1900, on the volcano Kilauea; and one from Hilo, Hawaii, collected by William H. Ashmead, July 6, 1901. The last I am sending you, together with a male and female from the United States."

Lonchoptera sp.—Mr. Bryan stated that a single specimen in the collection of the Bishop Museum, collected by Mr. Giffard at Twenty-nine Miles, Olaa, Hawaii, August, 1922, was determined as belonging to the family *Longchopteridae* by its striking and characteristic antennae and wing venation (Williston, N. A. Diptera, p. 240). This family of flies contains but a single genus, *Lonchoptera*. No specimens of this family have hitherto been reported from Hawaii.

Diocalandra taitensis (Guer.).—Mr. Swezey exhibited a piece cut from a leaf stem of coconut palm, showing the characteristic exit holes and borings of the Tahiti coconut weevil. He had obtained this from a leaf which had fallen from a thirty-foot high palm tree on Kinau street, Honolulu, February

9, 1923. This is further evidence of the general distribution of this weevil, though it is so scarce as to be difficult to find.

Pyralis manihotalis Guen.—Mr. Swezey exhibited a specimen of this Pyralid moth collected at light by Mr. Ehrhorn, February 9, 1923, in Manoa. This is the first specimen of this moth collected for a long time. Dr. Perkins collected one specimen in Honolulu over twenty years ago, and Blackburn had collected it in his time. No specimens are in any collections in Honolulu. Its habits are not known here. It is a species ranging from South America, Australia, Malay Archipeligo, South Asia, and Africa.

Maruca testulalis Geyer.—Mr. Swezey stated that, since reporting this Pyralid moth at the February meeting, he had come across a specimen of it among some insects at the Bishop Museum, collected on Tantalus last August by Professor Mosely from Ohio, who was visiting the Islands last summer. That specimen will be the first capture of this immigrant moth here.

Pleistodontes froggatti Mayr.—Mr. Swezey reported having obtained a total of 211, or 178 females and 33 males of this fig-wasp from a single fig picked from the Moreton Bay fig tree in Emma Square, Honolulu, February 9, 1923. The tree was bearing an immense crop of fruit, many of which had already fallen to the ground, each fruit showing numerous exit holes where the fig-wasps had issued. The insects had issued before the fruits had fallen from the tree.

Pleistodontes imperialis Saund.—Mr. Swezey reported that this fig-wasp was established on a Ficus tree at Dr. Dean's home, Manoa. Examination of a fruit from this tree which Dr. Dean had handed to Dr. Lyon disclosed the presence in it of a considerable number of the fig-wasps. As none of the insects had been distributed in that vicinity, they must have reached there of themselves from the tree on Makiki Heights, where they had recently been found abundantly established. The distance might be about a mile in an air line.

Fijian Butterflies.—Mr. Swezey exhibited a collection of butterflies lately received from Hubert W. Simmonds, Government Entomologist at Suva, Fiji. It composed fourteen species

as follows, representing half or more of the species recorded from the Fiji Islands:

Tirumala neptunia (Feld.).
Niparia helcita (Boisd.).
Salpinx macleayi (Felder).
Deragena proserpina Butler.
Calliploea adyte Boisd.
Doleschalia bisaltide Cram.
Hypolimnas bolina Linn.
With color variations of the female.
Papilio schmeltzi Her.-Sch.
Xois sesara Hew.
Terias hecabe L. (?)
Nacaduba vitiensis (Butl.).
Jamides woodfordi Butl.
Undetermined *Lycaenid.*
Undetermined *Hesperid.*

APRIL 5, 1923.

The 209th meeting of the Hawaiian Entomological Society was held at the Experiment Station of the Hawaiian Sugar Planters' Association, President Muir presiding. Other members present were Messrs. Bissell, Bryan, Crawford, Ehrhorn, Illingworth, Swezey, Timberlake, and Willard.

The minutes of the previous meeting were read and approved.

PAPER.

"Stability of Specific Names." *

BY F. MUIR.

NOTES AND EXHIBITIONS.

Evaza javanensis Meij.—Mr. Bryan stated that this small black and brown Stratiomyid fly, hitherto known as *Acanthina* sp., was given this identification by Mr. Brunetti at the British Museum. Mr. Brunetti also stated that our "*Sargus* sp." is the same as that mentioned in the Fauna Hawaiiensis under that name, that it belongs to the genus *Cephalochrysa* Kert., probably an undescribed species, and that he will describe it soon.

A mango pest in Rapa, Austral Islands.—Mr. Bryan exhibited a small series of Microlepidoptera, which were among

* For publication elsewhere. [Ed.]

a large collection of insects from the Austral Islands recently brought to the Bishop Museum by Mrs. A. M. Stokes. They bore the label, "November 26, 1921, Rapa, Ahurei. From larvae on mango blossoms. Entire crop destroyed."

Pyralis manihotalis Guen. — Mr. Swezey reported having secured a specimen of this moth at his house in Kaimuki, and that among insects collected at Pawaa Junction by Mr. Issiki, entomologist from Formosa, were two of this moth.

New Immigrant Bruchid.—Mr. Swezey exhibited a Bruchid which he had recently collected in a patch of cow peas at the United States Experiment Station, Honolulu, which is apparently different from the Bruchids at present known here. Whatever species it is has not yet been determined.

Pheidole megacephala Fab.—Mr. Illingworth stated that on April 3, 1923, he had found this omnivorous ant destroying the parasitic wasps, *Scolia manilae* Ashm. Sweet potato blossoms on the banks of reservoir No. 6, in the Oahu Sugar Company's plantation, were simply alive with these ants. They were probably driven out of the soil by the recent heavy rains, and were certainly improving their opportunity by waylaying every Scolia wasp that visited these flowers. Many of the wasps were observed overpowered by the ants, and in various stages of being dismembered. It must be stated, however, that conditions at the time were very exceptional and probably do not occur more than a few days out of the year. At any rate, he stated, this was the first time that he had observed the ants attacking Scolia in such numbers. It is a well-recognized fact that the ants are more troublesome during the wet season, coming into houses, getting into bee-hives, etc., hence, they will probably let the wasps alone as soon as the soil becomes sufficiently dry for them to return to it.

Pycnoscelus surinamensis (Linn.)—Mr. Illingworth gave the following note on this roach: In my search for early references to Hawaiian entomology, I found that Eschscholtz, who was here in 1816, described a roach, *Blatta punctata,* in his Entomographien, p. 86, published in 1822. I recently wrote Mr. Morgan Hebard, requesting information as to which of our present spe-

cies this name referred. In his reply of January 16, 1923, he states:

"Blatta punctata Eschscholtz, described in 1822 from the Hawaiian Islands, is a synonym of **Pycnoscelus surinamensis (Linnaeus)**, as has been indicated by Kirby in his catalogue of 1904. This record was overlooked in my recent study of Hawaiian Orthoptera, where I noted only the first record for the islands as **surinamensis."**

Elytroteinus subtruncatus (Fairm.).—Note by J. F. Illingworth. An interesting new habit for this weevil is recorded in the New Zealand Journal of Agriculture (Vol. XXVI, p. 34, January, 1923.), where it is called "the Fiji Lemon Weevil." Lemons from Cook Islands were found to be infested by the larvae of this species; the adults being determined by Dr. G. A. K. Marshall of the British Museum. The attack on the fruit was at the base of the stalk, the larvae boring into the pulp, where pupation took place. Recently this species was recorded from Honolulu by Swezey (Proc. Haw. Ent. Soc., Vol. IV, pp. 82-83), who found it infesting the roots of white ginger. Dr. Marshall identified the Hawaiian material as *Pteroporus subtruncatus* Frm. (See idem. p. 361); but afterwards proposed (Bull. Ent. Res., London, Vol. IX, p. 278) *Elytroteinus* n. n. for *Pteroporus* Frm. of which the only species is *Elytroteinus subtruncatus.* The indications are that this is a dangerous introduction, and it behooves entomologists to be on the lookout for infestations of other crops. Such a general feeder might even decide to levy a heavy toll upon our pineapple industry.

Pheidole megacephala Fab.—Mr. Willard exhibited a vial of the dead bodies of this ant, which he had found very abundant on the trail into Waianae Valley on March 19, 1923. It is estimated about 200 piles, ranging in size up to three inches in diameter and to three-quarters of an inch deep, were observed in the trail. Mr. Illingworth and Mr. Swezey stated that they had seen similar piles of these ants in irrigation ditches in sugar-cane fields, and that the dead ants had apparently been removed from the nests after being drowned.

Coelophora inaequalis Fab.—Mr. Timberlake reported that specimens of the nine-spotted form of this ladybeetle had been

seen in Honolulu on several occasions during the past six months. This and the black form were liberated in considerable numbers in the Punahou district and Manoa Valley during the fall of 1919 and the following winter.

MAY 3, 1923.

The 210th meeting of the Society was held at the usual place and was attended by the following members: President Muir, who presided, and Messrs. Bissell, Bryan, Illingworth, Rosa, Swezey, Timberlake, and Willard.

The minutes of the previous meeting were read and approved.

NOTES AND EXHIBITIONS.

Euplectrus platyhypenae How.—Mr. Swezey exhibited all stages of this army-worm parasite which he was rearing on a large scale in the insectary, from material received from H. T. Osborn, collected at El Potrero, Vera Cruz, Mexico. The parasite lays eggs in clusters of two to fifty on the backs of caterpillars. The eggs hatch in three days; the larvae finish their growth in four days; and the adults appear in about a week, so that the period from oviposition to adult is about two weeks. Oviposition occurs on the two army-worms, *Cirphis unipuncta* and *Spodoptera mauritia*, and on the garden cutworm *Lycophotia margaritosa*. Probably any such kind of larvae that are available would be made use of.

Maruca testulalis Geyer.—Mr. Swezey exhibited a specimen of this moth reared from a caterpillar found in a lima bean pod, where it was feeding on the seeds. It was found April 11, apparently full grown, for it spun up the next day, and pupated April 13, the cocoon being thin enough so that the pupa was readily seen. The adult issued ten days later on April 23. This is the same moth first reported by Mr. Swezey at the January meeting, reared from pea pods.

Pseudopheliminus sp. — Mr. Timberlake exhibited a few specimens of an Eulophine recently discovered on Oahu. One male was collected by Mr. Swezey at Waialae, November 26,

1922, and two males and one female were reared from *Gracilaria marginestrigata* Walsm. on *Sida,* collected at the Peninsula on March 11, 1923. The female has a small, round, black spot beneath the stigmal vein, and the male has three-branched antennae.

Berecyntus sp. — Mr. Timberlake exhibited many living females of a new species of *Berecyntus* reared April 24, from an *Agrotis* larva (species not determined), collected February 23, 1923, at Pasadena, California. The species is evidently polyembronic, the females ovipositing in the eggs of the host. Eggs of *Spodoptera mauritia* Boisd. and of *Plusia chalcitis* Esp. when placed with the females were not noticed, but eggs of *Agrotis ypsilon* Rott. immediately caused great excitement among the parasites and were oviposited in freely. Sometimes two or even three females were seen ovipositing in the same egg.

Bruchobius sp.—Mr. Timberlake exhibited specimens of a Pteromalid provisionally determined as a new species of *Bruchobius,* which has not been recorded from the Islands. One female was taken on the laboratory window September 13, 1916, and recently large numbers have been issuing from pigeon peas infested by *Bruchus quadrimaculatus* Fab. and *Bruchus chinensis* Linn. (O. H. Swezey, collector). Two specimens of the same parasite from Bangalore, India, were also shown, which had been bred from *Bruchus.*

Coptotermes intrudens Oshima.—Mr. Bryan reported that a considerable flight of these termites was noticed about the business district of Honolulu on April 1, 2, and 3, 1923. Also that Dr. Illingworth had noticed them swarming about lights in the Honolulu Public Library on April 26, 1923.

Mr. Muir exhibited specimens of *Odynerus nigripennis* (Holmg.), *Echthromorpha maculipennis* Holmg., *Oodemas aenescens* Boh., *Scymnus kinbergi* Boh., *Sarcophagus dux* Thoms., and *Sarcophagus barbata* Thoms., which he had taken to Europe at Mr. Timberlake's suggestion to compare with types at Stockholm. Both Dr. A. Roman and Mr. Muir had compared these insects with the types, and concluded they were rightly determined. They will be placed in the collection of the Society.

JUNE 7, 1923.

The 211th meeting of the Hawaiian Entomological Society was convened at the usual place at 2:30 p. m., with President Muir in the chair. Other members present were Messrs. Bissell, Bryan, Crawford, Fullaway, Swezey, Timberlake, and Willard.

The minutes of the previous meeting were read and approved.

PAPERS.

"A New Hawaiian Rhyncogonus."

BY R. C. L. PERKINS
(Presented by O. H. Swezey.)

"The Bishop Museum Collection of Psyllidae."

BY D. L. CRAWFORD.

NOTES AND EXHIBITIONS.

Cutworm enemies.—Mr. Fullaway reported that the following cutworm enemies, the Carabid beetle, *Calosoma semilaeva* and the Chalcid fly *Euplectrus platyhypenae*, were being distributed at the Waikii station of the Parker Ranch.

Coccinella sp. — Mr. Timberlake exhibited a specimen of *Coccinella* taken by Mr. Swezey, June 1, 1923, in Field 39, Oahu Sugar Co., Oahu. It is close to *Coccinella 11-punctata* Linn. and might easily pass for that species, but differs specifically in the male genitalia.

Pseudopheliminus sp. — Mr. Timberlake reported that the species recorded at the last meeting from Oahu has since been taken on Kauai by Mr. Swezey. One female having been reared from *Gracilaria hauicola* collected at Hanalei on May 16.

Maruca testulalis Geyer.—Mr. Swezey reported finding on May 29, the larvae of the Indian pea moth quite abundant in the flowers of *Sesbania grandiflora*, growing at the Pineapple Experiment Station grounds on the next ridge beyond Alewa Heights. The larvae were feeding in the large flowers in the region of the staminal column, and at the base of the flower, both in the fresh flowers and in withered flowers. There were green pods on the trees but no larvae were found in them.

Orthomecyna mesochasma Meyr.—Mr. Swezey exhibited a specimen of this Pyraustid moth, and reported having reared it from a whitish larva found among the roots of a stool of sugar-cane at the Lihue Plantation on Kauai, May, 1923. The larva was apparently full grown and did not do any more eating, so it was not determined as to its feeding habits. The native genus *Orthomecyna* has fourteen species whose habits are entirely unknown. This is the first time that a larva of any species has been discovered. The species *mesochasma* is very abundant on Kauai and often comes to light in large numbers.

Draeculacephala mollipes Say. — Mr. Swezey reported the capture of this large green Jassid in a garden at Kilauea, Kauai, May 11, 1923. It has been collected on Kauai on only one other occasion, when Mr. Bryan collected it at Nualolo beach on Naio, in June, 1922.

Cyrtorhinus mundulus (Bredd.).—Mr. Swezey reported having found in May that this bug was spread through all the sugar plantations of the Island of Kauai, wherever any leafhoppers were to be found. A colony was liberated at Kekaha in August, 1921, and this spread has taken place since then.

Flight of Termites.—Mr. Willard reported having observed the flight of great numbers of termites, probably *Coptotermes intrudens,* on the evening of May 10, 1923, on Beretania and Young streets near the McKinley High School. The flight occurred after a warm, sultry day, beginning soon after dark and ending about 9:30 p. m. At 10 p. m. none of the insects were seen flying about lights.

JULY 5, 1923.

The 212th meeting of the Hawaiian Entomological Society was held at the usual place, President Muir presiding. Other members present were Messrs. Bissell, Bryan, Rosa, Swezey, Timberlake, and Willard. Mr. R. Ewart was a visitor.

The minutes of the previous meeting were read and approved.

NOTES AND EXHIBITIONS.

Mr. Bryan exhibited a large collection of insects, spiders,

etc., which he had collected on a recent trip to Nihoa and Necker Islands and French Frigate Shoals.

Horismenus sp.—Mr. Willard reported the recovery of this parasite from *Mylabris sallaei* in pods of *Acacia farnesiana,* collected on the Waianae road just beyond Ewa Plantation, June 16, 1923. He stated that this parasite was the last to become established in the field, of the four Bruchid parasites, which were introduced from Texas in 1921 by the Federal Bureau of Entomology.

Limnophora arcuata Stein.—Mr. Swezey reported having reared this Anthomyid fly from puparia collected in cow dung in Mr. Eric Knudsen's pasture, Koloa, 700 feet, Kauai, May 14, 1923. When collected, the puparia were taken for those of the horn-fly, but this Anthomyid issued instead. Examination of the puparia shows that they are quite different from horn-fly puparia. From two of the fifteen puparia collected, there issued two specimens of *Spalangia cameroni.* Specimens of the fly were also collected at the Lihue Hotel.

Notogonidea luzonensis Rohw. — Mr. Swezey exhibited a specimen of this Philippine cricket wasp collected July 4 in his garden at Kaimuki. This indicates that it is becoming more widely spread since the first recovery last March.

Maruca testulalis Geyer.—A specimen of the Indian pea moth was exhibited by Mr. Swezey, collected by him among pigeon peas in his garden, July 4, 1923. Probably the larvae of the moth were feeding in the pigeon pea pods, but none were found.

Polytus mellerborgi (Boh.).—Mr. Swezey reported collecting this weevil on banana plants on Kauai, both in the garden at Lihue Hotel, and on bananas growing wild along the streams back in the mountains at headwaters of Wailua River.

Tiny Carabid from Cane Stools.—A specimen of this minute Carabid was exhibited by Mr. Swezey. He had collected it among cane roots at Grove Farm, Lihue, Kauai, May 18, 1923. He reported also having collected a few at the same place last year, but had not reported it at the time. It is the same beetle first found in a cane stool at Puuloa, Oahu, in 1922 and reported at the time.

SEPTEMBER 6, 1923.

The 213th meeting of the Society was held at 2:30 p. m. at the H. S. P. A. Experiment Station, President Muir in the chair. Other members present: Messrs. Bissell, Fullaway, Timberlake, Whitney, and Willard.

Owing to the absence from Honolulu of a number of members, no meeting was held in August. The minutes of the 212th meeting, held in July, were read and approved.

The Secretary reported that the Proceedings for the year 1922 were mailed on September 4, 1923.

The Secretary read a communication from The Academy of Natural Sciences of Philadelphia setting forth the financial status of the *Zoological Record,* and stating that the Zoological Society of London was suffering an annual loss of £1100 on its publication. The letter stated that unless all but £500 of this annual loss could be covered by zoologists and zoological societies throughout the world, it would be necessary to discontinue the publication of the Record, and this society was asked for assistance.

Upon motion by Mr. Fullaway, this communication was referred to the Executive Committee for action.

NOTES AND EXHIBITIONS.

Antonina indica Green.—Mr. Fullaway reported finding the larvae of *Antonina indica* on the roots of pineapple at Moanalua, Oahu, August 21, 1923.

Xenophyes cascus.—Mr. Muir exhibited a nymph of *Xenophyes cascus* Bergroth from New Zealand. The insect belongs to the small family Peloridiidae and they are of interest because they have their head deflexed and inflexed in a manner similar to Homoptera. Without disection it is impossible to state if there be a gula or not, but from the appearance of the labium it would appear that there is not. If this be the case then it may be necessary to place the family in a suborder by itself.

A Bruchid new to Hawaii.—Mr. Bissell exhibited several specimens of a Bruchid new to Hawaii and determined by him

as *Bruchus amicus* Horn, and stated that several specimens had been forwarded to the Federal Bureau of Entomology, Washington, D. C., for verification of his determination. The first specimen was obtained by Mr. Bissell at the U. S. entomological laboratory, January 18, 1923, where it was bred from pods of *Prosopis juliflora* collected in Honolulu. One specimen of this same species was collected by Mr. Swezey at the U. S. Experiment Station and reported in the meeting of the society on April 5, as a new immigrant Bruchid. Mr. Bissell stated that it has since been bred very numerously from both green and ripe pods of *P. juliflora*, which had been collected at various places, Wailupe wireless station and a point two miles beyond Waipahu on the Ewa road.

OCTOBER 4, 1923.

The 214th meeting was held at 2:30 p. m. at the usual place, President Muir presiding. Other members present: Messrs. Bryan, Crawford, Fullaway, Giffard, Timberlake, and Willard.

The minutes of the previous meeting were read and approved.

The Secretary reported that the Executive Committee had considered the request for financial assistance for publication of the Zoological Record. The Committee recommended that no funds of the Society be used for this purpose, since it is necessary to obtain outside assistance each year to pay for its own publications. The great value of the Zoological Record to systematic workers in all branches of Zoology was recognized by the Committee, and it was their opinion that voluntary subscriptions from the members of the Society might be secured for this purpose.

Upon motion by Mr. Giffard, it was voted that the report of the Executive Committee be accepted, and that the Treasurer systematically canvass the members and friends of the Society and raise at least $25 to forward to the Zoological Record.

NOTES AND EXHIBITIONS.

Ethmia colonella Walsm.—Mr. Bryan stated that Dr. C. M. Cooke, Jr., had reported a Kou tree, *Cordia subcordata* Lam..

near his beach house at Malaekahana, near Laie, Oahu, almost defoliated by a small, green caterpillar. He exhibited a series of this moth which was captured about the tree by Dr. S. C. Ball, although no caterpillars were seen at the time.

Xiphidiopsis lita Heb.—A female specimen of this Tettigoniidae was taken by Mr. Fullaway in Honolulu, September 11, 1923. Hitherto it has been known only from the town of Hilo, and vicinity, Hawaii, where it appeared first in 1919.

Nysius delectus White.—Mr. Giffard exhibited a large number of these insects, which had been taken at large by Mr. Irwin Spalding on the ridge near Green Peak, overlooking Nanakuli Valley, on the Waianae Range, Oahu. Mr. Spalding reported that, in the latter part of September, 1923, while tramping along the thickly vegetated ridge on its windward crest during heavy wind and showers, he noticed that the fronds of tree ferns, mokehana, and other vegetation, when disturbed, caused enormous flights of these heteropterous insects, so much so, that their contact with the face and clothing became annoying. These facts caused Mr. Spalding to investigate, and he reported that certain of the vegetation, more particularly the ferns, contained large masses of these insects which, in spots, had assembled in millions. As an example he claims that on a single frond of tree fern he and his companions observed an assemblage of these insects over one inch thick by three inches long and two inches wide, from which he captured a handful of *Nysius* of which this exhibit forms a part. Mr. Spalding further stated that this unusual flight continued for half a mile on the ridge and that the insects appeared to be quite undisturbed by the wind and rain, but flew in myriads just as soon as the bushes were disturbed. No cause for the unusually large numbers was advanced by Mr. Spalding and no perceptible damage to the vegetation was observed by him. Mr. Fullaway reported a similar occurrence at Waikii, Parker Ranch, on corn, thickly congregated but not bunched in layers. Mr. Bryan had observed a number on *Chenopodium* bushes on Necker Island, all bunched up in several layers.

Chalcid Flies.—Mr. Timberlake exhibited the following species, giving new records:

Xesmatia flavipes Timb., one female on **Sapindus**, Kilauea, Hawaii, August 5, 1919 (Swezey).

Pauridia peregrina Timb., one female on Koa, Kilohana, Kauai, September 1, 1920 (Swezey).

Anicetus annulatus Timb., one female, Kaiwiki, Hawaii, September 22, 1918 (Swezey).

Adelencyrtus odonaspidis Full., series, all females, Honaunau, Hawaii, August 13, 1919 (Swezey).

Microterys flavus Howard, one female, Kaumuohona, Oahu, January 17, 1917 (Bridwell).

Hypergonatopus n. sp., one female, southeast Koolau Mountains, Oahu, February 4, 1917 (Bridwell).

Zeteticontus sp., one female, Honolulu, 1906 (Perkins), taken in garden.

Paranacryptus lacteipennis (Cameron). Three females taken in Honolulu, November, 1907 (Terry); October 19, 1915 (Swezey); and September 29, 1923 (Timberlake). These are apparently all the specimens of this species in the local collections. The species was described as an **Epitranus**, but agrees fairly well with **Paranacryptus.**

Tanager Expedition.—Mr. Bryan reported on the recent expedition to Nihoa, Necker, and French Frigate Shoals, exhibiting several maps of the islands and a number of photographs. He also gave an outline of the insects and plant life observed on each.

NOVEMBER 1, 1923.

The 215th regular meeting of the Society was held in the usual place, President Muir in the chair. Other members present: Messrs. Bryan, Crawford, Ehrhorn, Fullaway, Giffard, Pemberton, Rosa, Swezey, and Timberlake.

The minutes of the previous meeting were read and approved.

Mr. Muir reported that in accordance with the motion of the previous meeting to canvass the members of this Society for subscription in relief of the distressed financial condition of the publishers of the Zoological Record, a total of $30 had been

subscribed. The Society approved the forwarding of this fund direct to the Zoological Society of London.

PAPERS.

Mr. Bryan read a paper entitled, **"Scenopinus in Hawaii."**

Mr. Timberlake presented a discussion on a paper by him on the **"Hymenoptera of Nihoa, Necker and French Frigate Islands,** collected by Mr. E. H. Bryan of the Tanager Expedition." The collection was exhibited. This paper has been withdrawn for publication elsewhere.

"Further Notes on Chrysomyia Megacephala."

BY J. F. ILLINGWORTH.
(Presented by E. H. Bryan, Jr.)

Mr. Swezey presented a paper under the title: **"Notes on Economic Insects in America Samoa."** He particularly discussed the insect fauna of the coconut palm, sugar cane, papaia, taro, banana, and cucumber.

"New Fulgorids from the West Indies."

BY F. MUIR.

NOTES AND EXHIBITIONS.

Mr. Ehrhorn exhibited a large photo of members in assembly of the 1923 meeting of the Pan-Pacific Scientific Conference in Sydney, Australia.

Zatropis tortricidis Cwfd.—Mr. Timberlake exhibited specimens of this Pteromalid which has been collected from Oahu, Kauai, Maui and Hawaii, and a paratype female from Northeast, Pennsylvania, loaned for comparison by the U. S. National Museum. The species was first taken in Honolulu in January and December, 1902, by Dr. Perkins, who reared it from *Gracilaria marginistrigata.* It has also been reared from *Cremastobombycia lantanella* and from lantana berries, so that it is probably parasitic on *Agromyza lantanae.*

Pheidole megacephala (Fab.)—Mr. Crawford discussed the swarming of this ant on a potted palm at the University of Hawaii. He stated that the ants came from beneath a cement

floor and were driven out through the leaking of a water pipe, and that there were from ten to twenty thousand massed on the leaves of the palm, carrying the eggs and immature stages with them.

Saissetia nigra (Nietn.)—Mr. Fullaway reported finding the black scale on pineapples at Moanalua. Mr. Timberlake stated that he had also seen it on nut-grass.

Scolia manilae Ashm.—Mr. Fullaway reported seeing this Philippine wasp numerous in pineapple fields at Moanalua.

Samoan Lepidoptera.—Mr. Swezey exhibited a collection of over 100 specimens of Lepidoptera collected in Samoa prior to 1914 by Julius Henniger. Mr. Swezey secured this collection while in Samoa in September, 1923. They will be deposited in the Bishop Museum, through the request of Mr. Henniger. Mr. Swezey stated that most of the moths in the collection are species described from India.

Xiphidiopsis lita Heb.—Mr. Swezey exhibited a specimen of this Tettigoniid collected at light at the University of Hawaii, October 20, 1923. It is the second record of this species from the Island of Oahu, the insect being known previously for the past four years at Hilo and vicinity on the Island of Hawaii. Mr. Bryan stated that he had also collected one at Kalihi. To date the male has not been seen.

Notogonidea luzonensis Rohw.—Mr. Swezey reported that he had collected the Philippine cricket-wasp at the following places: In house, Manoa Valley, October 9; in Y. M. C. A. Cafeteria, October 12; in cane field at Laie, October 16; Oahu Sugar Co., Field 53, October 17. Two of these recently introduced wasps were also seen on the ridge at Kuliouou, October 14, but not captured. This indicates a very wide natural spread from the original point of liberation at the H. S. P. A. Experiment Station grounds in March, 1922. Mr. Fullaway stated that he had also seen it in the pineapple fields at Moanalua recently.

Tineola biselliella (Hum.).—Mr. Swezey exhibited specimens of this clothes-moth and stated that they were reared by Mr.

Giffard from larvae found on a woolen hat at his bungalow at Twenty-nine Miles, Olaa, Hawaii. This is commonly known as the webbing clothes-moth. It has previously been recorded in Honolulu by Dr. Illingworth feeding in brushes at the University of Hawaii (Proc. Haw. Ent. Soc., III, p. 274, 1917). Mr. Timberlake showed a parasite *Apanteles hawaiiensis* which he stated Mr. Giffard had reared from a cocoon of this moth, at the same locality.

Epigramorpha fidilis.—Mr. Swezey exhibited and discussed a snail which he had found crawling about in a package of cane sent from Wailuku, Maui, packed in moss. The moss was secured in Wailuku and was originally from E. O. Hall & Son, Honolulu, who probably imported it from the States for packing material. The snail, according to Dr. Cooke, of the Bishop Museum, occurs in Oregon, Washington and British Columbia, but is not known to be established in Hawaii. It is probably *Epigramorpha fidilis.*

Japanese earthquake.—Mr. Bryan read a letter from Dr. J. F. Illingworth, dated October 24, 1923, written from Japan, describing the losses of his entomological equipment and collections owing to the recent earthquake and fire in Japan.

Australian ants.—Mr. Bryan exhibited some Australian ants received at the Bishop Museum from Prof. Dr. Yngre Sjostedt of the Naturhistoriska Riksmuseets, Stockholm. One hundred and four species are represented by 113 specimens, thirty-seven of which are cotypes.

Tanager Expedition.—Mr. Bryan exhibited a collection of insects and photos taken by him while on the Tanager Expedition to Johnson and Wake Islands in July and August, 1923, and gave some interesting facts relative to the vegetation, topography and insect fauna of the islands.

DECEMBER 6, 1923.

The 216th meeting of the Hawaiian Entomological Society was held at the H. S. P. A. Experiment Station, President Muir presiding. Other members present: Messrs. Bissell,

Bryan, Crawford, Ehrhorn, Fullaway, Giffard, Pemberton, Rosa, Swezey, Timberlake, Wilder, and Willard.

The Treasurer reported a balance on hand December 1, 1923, of $118.59.

The following officers were elected for the year 1924:

President, O. H. Swezey; Vice-President, H. F. Willard; Secretary-Treasurer, D. T. Fullaway.

Additional members of the Executive Committee, D. L. Crawford and W. M. Giffard.

PRESIDENTIAL ADDRESS.

"Homoplasmy or Convergent Development of Evolution."

BY F. MUIR.

PAPERS.

"Records of the Introduced and Immigrant Chalcid-flies of the Hawaiian Islands (Hym.)."

BY P. H. TIMBERLAKE.

"Descriptions of New Chalcid-flies from Hawaii and Mexico (Hym.)."

BY P. H. TIMBERLAKE.

"Notes on Hawaiian Aphidae With Records of Food Plants (Homoptera)."

BY P. H. TIMBERLAKE.

NOTES AND EXHIBITIONS.

Atropos divinatoria Müll. — Mr. Timberlake exhibited two vials of insect material, one of which had been heavily attacked by this Psocid. The other which showed very little attack, contained many of the Psocid egg parasite, *Alaptus globosicornis* Gir.

Musca vicini Macquart. (=*Musca flavinervis* Thomson).— Mr. Bryan submitted the following note on this muscid: Major W. S. Patton in the Philippine Journal of Science, Vol. 23, No. 4, pp. 311, 326, 328, 1923, records the synonymy and

relationship of this fly. This is the Oriental house-fly with the narrow fronted male, figured and discussed by Dr. Illingworth in these Proceedings, Vol. V, p. 275, 1923. Our typical house-flies have characters intermediate between this species and *M. domestica* Linn. Mr. Bryan stated also that the collection of Muscidae from Java, Amboina and Borneo, discussed by Major Patton (id. 323), was collected by Mr. F. Muir, and that the type of *Musca illingworthi* when returned, will be deposited in the collection of the Hawaiian Sugar Planters' Experiment Station, with a paratype in the Bishop Museum.

Scenopinus fenestralis Linn.—Mr. Bryan stated that the "new fly" recorded by Mr. Fullaway (Proc. Haw. Ent. Soc., Vol. V, p. 204, 1923), which resembled *Milichia* (Agromyzidae) has since proved to be an undersized male of *Scenopinus fenestralis* Linn. The males have a transverse white band on the abdomen.

Scholastes bimaculatus Hendel. (Ortalidae).—Mr. Wilder exhibited a series of specimens of this coconut fly, which had been bred by Mr. Bryan from coconuts furnished him from Mr. Wilder's place in Honolulu. He stated that the maggots of this fly were white when young and a deep blue when full fed. It was described from Fiji and Samoa about 1878, and is closely allied to species which occur throughout Southeast Asia and Oceania.

Oestrus ovis Linn.—Mr. Fullaway reported the finding of a large number of this sheep head maggot in the head sinus of a goat, which was killed by Mr. Albert Horner in Tauhau Valley on Kauai, during November, 1923.

Oliarus eggs.—Mr. Swezey reported the finding of a batch of eggs on the surface of a bracket fungus collected from a koa log on Mt. Ohulehule, October 28, 1923, which, on hatching, turned out to be *Oliarus*. Apparently it is the first record of the finding of eggs of *Oliarus* in Hawaii. There were about a dozen of the oval white eggs loosely enclosed beneath what had the appearance of a small bit of lichen. The inner edge of this was composed of white, waxy material usually found at the

apex of the abdomen of the female *Oliarus;* the outside was greenish as if covered by a minute growth of lichen.

Tinea pellionella Linn.—Mr. Swezey exhibited a portion of a saddle cloth of coarse hair, which Mr. Giffard had found infested by this species of clothes moth at his barn on Keeaumoku street, Honolulu. Hundreds of the larval cases were present, and a score or more of moths had issued in the two weeks the material had been under observation.

Staphylinid attacking fruit-fly larvae.—Mr. Bissell exhibited a specimen of a *Staphylinid* beetle, which was collected by E. A. Back and C. E. Pemberton in 1913, and reported by them as attacking the larvae of the Mediterranean fruit-fly in Manoa Valley, Honolulu. He stated that it was different from any species he could find in Hawaiian collections; but that it resembled superficially *Leurocorynus cephalotes* in the Bishop Museum collection, and that possibly it was of the same genus. Also that it was near to *Phyrocephalys coclestis* from Australia.

Pyralid caterpillar on celery.—Mr. Fullaway reported taking a *Pyralid* caterpillar on celery which had been imported into Honolulu from California.

PAPERS PRESENTED DURING 1923.

Hawaiian Trypetidae (Diptera).

BY E. H. BRYAN, JR.

(Presented at the meeting of March 1, 1923.)

I have received two letters from Prof. Dr. M. Bezzi, in reply to a box of Hawaiian fruit and gall-flies, and a request for his opinion on their nomenclature. He states that *"Chaetodacus cucurbitae* and *Ceratitis capitata* are the usual forms," . . . but thinks that *crassipes, cratericola,* and *dubautiae* should be retained in *Tephritis,* although he admits that they are "very like *Trypanea,* in having a star-shaped terminal spot, which is, however, combined with a net-like pattern continued to the base of the wing." He goes on to say that "these species seem to form a group peculiar to the Islands, only the unknown *limpidapex* being a more typical *Tephritis."*

At the July 6 meeting of the Society, last year, on the authority of Dr. Aldrich, I referred these three species to the genus *Trypanea.* In view of Dr. Bezzi's familiarity with the group, it might be wise to leave them in the genus *Tephritis,* but in order to distinguish them from the typical *Tephritis,* to place them in a sub-genus *Trypanoidea, Tephritis crassipes* (Thomson) being typical of the sub-genus. *T. swezeyi* and *T. limpidapex* would not belong in this sub-genus.

Scenopinus in Hawaii (Diptera).

BY E. H. BRYAN, JR.

(Presented at the meeting of November 1, 1923.)

It has been known for some time that there were two introduced species of *Scenopinus* in Hawaii. One has infuscated wings, black halteres, and dark legs with yellow tarsi; and the other, nearly clear wings, reddish-brown legs, and the halteres with conspicuous white knobs.

Grimshaw (Fauna Hawaiiensis, Vol. III, p. 11, 1901), records *Scenopinus niger* "Mg." (which should be "(De Geer)") as collected in "Hotel, Honolulu." Just recently I found a reference by Brunetti (Fauna British India, Diptera Brachycera I, p. 312, 1920) that *Scenopinus fenestralis* (Linn.) occurred in Hawaii.

Lundbeck (Diptera Danica, pt. 2, p. 159, 1908) gives descriptions and a key separating these species and I find that our specimens fit these two species very nicely. They may be separated by the following key:

Wings strongly infuscated; eyes separated in both sexes; legs blackish, tarsi yellow; halteres dark.....*S. niger* (De Geer).

Wings not strongly infuscated; eyes of male contiguous; legs ferruginous; halteres with white knobs.....*S. fenestralis* (Linn.).

These flies may be easily recognized. They are jet black, with a flattened abdomen, the seven segments of which bear transverse depressions. They are quite bare of bristles, even the arista of the small, three-jointed antennae being lacking. They are most frequently seen on windows, but are also occasionally found elsewhere, as on Ewa Coral Plain. The larvae are elongate, cylindrical, of about twenty segments. They are thought to be carnivorous, living upon the larvae of small moths, fleas, etc. They are associated with certain groups of plants, as the Umbelliferae, and on *Syringa, Rosa* and *Carpinus.*

The Bishop Museum Collection of Psyllidae (Homoptera).

BY D. L. CRAWFORD.

(Presented at the meeting of June 7, 1923.)

Several hundred specimens of Hawaiian Psyllidae in the Bishop Museum were recently assembled by E. H. Bryan and examined by the writer. Twelve species were found to be represented in this collection, as follows:

Trioza iolani Kirkaldy.
Trioza ohiacola Crawford.
Trioza hawaiiensis Crawford.
Hevaheva perkinsi Kirkaldy.
Hevaheva giffardi Crawford.
Hevaheva silvestris Kirkaldy.
Hevaheva monticola Kirkaldy.
Kuwayama minuta Crawford
Kuwayama nigricapita Crawford.
Kuwayama gracilis Crawford.
Cerotrioza bivittata Crawford.
Megatrioza palmicola Crawford.

The following observations may be of interest. Maui and Kauai are both represented in this collection, whereas in published records of Psyllidae neither of these islands has figured much.

Trioza iolani occurs on Maui, judging from the presence of one specimen of this species from Iao Valley, on Ohia lehua.

Trioza ohiacola is a more widely distributed species, occurring on most if not all the islands and forming galls on leaves of Ohia lehua, as does *Trioza iolani* also. This is a variable species and seems to merge into *T. iolani.* Specimens, some very typical of the species and some not very typical, appear in the collection as from Kilauea, Glenwood, Kaiwiki and South Kona (all on Island of Hawaii); Iao Valley, Maui; and a number of upland points on Oahu.

Kuwayama gracilis is represented from several points on Oahu and several specimens collected on Maui (Iao Valley and Kailua) appear to belong to this species, but show a strong tendency to revert to *Trioza* in having genal cones. This genus is distinguished from *Trioza* by the absence of genal cones, the paired projections on the front of the head. The fact that several species from widely separated regions have been referred to this genus and the further fact that each of these species appears to be more closely related to certain *Trioza* species in the same region than to other *Kuwayama* species elsewhere, would seem to indicate that the absence of genal cones is a characteristic derived independently in different localities as parallel evolutional development.

The Maui specimens of *K. gracilis* and one specimen from Oahu appear to belong to this species without much doubt, except that the genal cones are not wholly wanting. Whether these particular specimens really represent another species or not is left for further study to determine.

Kuwayama minuta is represented by a considerable number of specimens from Kauai (Summit Camp).

The other species in the collection present nothing of notable interest.

Notes on Coccinellidae.

BY D. T. FULLAWAY.

(Presented at the meeting of March 1, 1923.)

Curinus coeruleus (Muls.).
Mulsant Spec., p. 472.

Description of Immature Stages.

Egg. Deposited in clusters of from one to two dozen eggs. Individual eggs cylindrical, tapering at the ends, exceeding 1 mm. in length, pearly white, smooth, although microscopically sculptured, micropylar end roughened by the presence of numerous minute granular papillae in a circular area about the opening, attached by an adhesive fluid at opposite end, but seldom erect, usually procumbent.

Larva. Eight mm. long, 3 mm. wide at middle, tapering to both ends, moderately convex, integument finely reticuately rugose; head small, roughly rectangular, a little longer than wide (dorsal view), fairly smooth, black, with a few scattered pale hairs; ocelli three on either side of the head, near antero-lateral angle, directly behind antennae, which are short and three-segmented; the maxillary palpi are considerably larger and three-segmented also; the labial palpi two-segmented. Prothorax much larger than head, roughly triangular in outline (dorsal view), creamy white, the cervical shield brownish, bisected by a median longitudinal white vitta, each half with a black border except for a short distance on posterior margin and with two black spinous tubercles bearing many black spinous hairs situated midway on outer lateral margin; many black spinous hairs on the flat plates. Mesothorax, metathorax and ten abdominal segments transverse, mesonotum and metanotum with four, abdominal tergites, except the last two, with six longitudinal rows of large black spinous tubercles bearing black spinous hairs. These are disposed with reference to individual nota as follows: On the mesonotum two outer (pleural) and two inner (lateral) tubercles on either side, the former widely separate, the latter close together and with a brown spot bordered with black at the base on the inner side; metanotum with two outer (pleural) and one inner (lateral) tubercle, the large oval basal spot entirely black; abdominal tergites with one pleural, one lateral and one dorsal tubercle on either side. There is a conspicuous submarginal crease or depression on either side between the lines of lateral and pleural tubercles. There are also scattered black spinous hairs medially on the mesothorax and metathorax, and laterally on the abdominal segments, a median single and lateral double row of small black depressed tubercles on the abdominal tergites, and spiracular openings in the intersegmental folds at the anterior margins of the first six abdominal segments, between dorsal and lateral tubercles, and on pronotum at base of anterior of the two pleural tubercles on

inner side. Color dusky, except an interrupted median longitudinal white vitta (already noted on pronotum), a white U-shaped area embracing the median section of the fourth and posterior margin of the third abdominal segment (to and including the bases of the two lateral tubercles) and the corresponding tubercles on the first and second abdominal segments; a white spot at the base of the corresponding pleural tubercles on the posterior side, as well as at the base of the posterior of the two pleural tubercles on the metathorax on the posterior side, and a median section of the pleural and lateral tubercles on first abdominal segment, lateral tubercle on second abdominal segment and dorsal tubercle on fourth abdominal segment, also as above indicated for prothorax and head. Penultimate segment with many light and dark hairs on posterior margin. Last segment retracted, appearing on the ventral side of body as a flat foot, the organ of attachment in pupation. Venter lighter, legs stout, transverse rows of depressed tubercles on the abdominal sternites.

Pupa. Formed within the shed larval skin, which is rent lengthwise from the anterior margin of the cervical shield to the posterior margin of the fifth abdominal tergite and an opening formed by the receding margins, the pupa lying in the hollow. Length, 5 mm.; width, 3.5 mm., depth, 2 mm. Viewed from above, roughly triangular in outline, the dorsal surface moderately convex. Head retracted beneath the pronotum and closely appressed to the body, not visible on dorsum; roughly triangular in outline, quite narrow at the clypeus although the sides are parallel for half their length. Pronotum deeply emarginate medially on the anterior margin for the reception of the head, lateral margins rounded, only the very posterior part visible from above, the posterior margin slightly curved outwardly. Mesonotum and metanotum transverse, the obtusely angled base of the wing covers joining them laterally, nine segments visible in the dorsal view of abdomen, which is roughly triangular in outline, all the segments transverse. The color of the body ranges from creamy white to reddish brown with dusky markings. Head mostly dusky, pronotum with two broad dusky vittae of reddish-brown ground color, mesonotum with an obtusely angulate narrow transverse black vitta behind anterior margin and two widely separated black spots in front of posterior margin on reddish brown ground, metanotum nearly black, a reddish brown oval area medially near anterior margin. Wing covers blackish along posterior lateral margin, otherwise reddish brown to dusky and yellowish brown; first abdominal tergite black with reddish brown anterior margin and with two pairs of papillae, the lateral ones situated close to the lateral margins, considerably elevated and conical, the median ones more tuberculate, a dusky to black transverse chitinization on each of the following segments to and including the eighth; ninth and tenth segments very small, the latter retracted and with a forked tail for the attachment of the body. Legs and maxillary palpi very conspicuous ventrally. Wing covers reaching posteriorly as far as the posterior margin of the fifth abdominal segment.

Figured in Biennial Report, Hawaiian Board of Agriculture and Forestry, 1921-22, Plate XI (opposite p. 64).

Egg stage	9 Days.
Larval stage	28 Days.
Pupal stage	7 Days.

Hyperaspis silvestrii Weise.
Boll. Portici v. 3, p. 205, 1908.

Description of Immature Stages.

Egg. Laid singly beneath the adult female of *Pseudococcus nipae*. Color, pale lemon yellow, elliptico-cylindrical, .5 mm. long, surface rugulose.

Larva. Young larva olive green, pale and sordid, .75 mm. long, head capsule thinly chitinized, dusky and shining, three ocelli on either side black, a black spot posteriorly on either side of the median line on pro, meso and metathoracic nota. Body clothed with pale hairs. Legs stout. Full grown larva 5 mm. long, 2 mm. wide, elongate oval, flatly convex, color pale clay yellow, darker medially, covered dorsally with white, waxy secretion. Secretes a sulphur yellow fluid from the dorsum when this is disturbed. Head small, transverse, labelliform, retractile, thinly chitinized and bearing fine hairs, ocelli two on each side, black, immediately behind the short, papillate antennae, which are two-jointed and setaceous at apex. Maxillary palpi four jointed. Labial palpi disc-like. Legs fairly stout. Prothorax transversely oval, narrower than the mesothorax or the metathorax. Abdominal segments transverse, narrowing slightly in a posterior direction from the metathorax. A longitudinal row of setigerous turbercles is present on the lateral margins, another within the margin of the metathorax and the first eight abdominal segments, three transverse rows of fine hairs on the pronotum, two on mesonotum and metanotum and a line along the lateral margins of each, a transverse row of hairs on the anterior margin of the first eight abdominal segments, ninth abdominal segment with the hind margin curved, a line of hairs along the caudal margin and a few scattered hairs on the notum, ventral surface nearly naked, the foot on the venter of ninth segment.

Pupa. Completely covered with a mass of white, waxy secretion. When denuded of this, the color appears the same as that of larva. Very convex dorsally, flat ventrally, short oval, 3.5 mm. long, 2.75 mm. wide, dorsally very hairy, head withdrawn to the venter and somewhat imbedded, the nota reaching nearly half the length of body, wing cases extending to the posterior margin of the fourth abdominal segment, last abdominal segment recurved onto the venter and bearing the foot or organ of attachment.

Figured in Biennial Report, Hawaiian Board Agriculture and Forestry, 1921-22, Plate XI (opposite p. 64).

Egg stage	7 Days.
Larval stage	27 Days.
Pupal stage	13 Days.

The Small Banana Weevil (Coleoptera).

BY J. F. ILLINGWORTH.

(Presented at the meeting of March 1, 1923.)

Polytus mellerborgi (Boheman).

Sitophilus mellerborgii Boh., Schoenherr, Genera et Species Curculionidum, vol. 4, p. 976, 1837. Hab., Java.

Calandra remota Sharp, Memoirs on the Coleoptera of the Hawaiian Islands. Sci. Trans. Roy. Dublin Soc., vol. 3 (Ser. 2), p. 254, 1885. Hab., Oahu. (?) Immigrant.

Polytus n. gen. for **mellerborgi** Boh., Faust, J., Curculionidae von Birma. Ann. Mus. Genova, Ser. 2, vol. XIV (XXXIV) 1894. Hab., Rangoon.

I first took specimens of this small weevil in Fiji, 1913, commonly in stems of growing banana, closely associated with the ordinary banana borer, *Cosmopolites sordidus* (Germ.). In fact, so closely were they associated with the larger weevil that for a time I considered them starved specimens of *sordidus*.

Returning to Hawaii, I sent specimens with other material to both the U. S. National Museum and to the British Museum for identification. Mr. Schwarz of the former institution determined them as *Calandra remota* Sharp. Just recently, in going over this material, I discovered that the specimens returned from the British Museum labeled "*Polytus mellerborgi* Boh." were the same species.

Looking up the original description of *mellerborgi*, it was evident that *Calandra remota* must be a synonym for this small banana borer. I wrote Dr. Guy Marshall of the British Museum for further confirmation, stating that we have exotic specimens in Honolulu collections from Borneo, Java, Amboina, Malay Peninsula, China and Fiji. In his reply of December 16, 1922, he states *Calandra remota* Sharp, is undoubtedly a synonym of *Polytus mellerborgi* (Boh.), which is widely distributed throughout tropical Asia.

I was interested in reviewing the literature to find that Faust says, "Einem Zwerg von *Cosmopolites sordidus*," which de-

scribes it perfectly, for it is an exact miniature of the larger weevil borer.

Additional References.

Sasscer, E. R., Important foreign insect pests collected on imported nursery stock in 1915, Journ. Econ. Ent., vol. 9, p. 218, 1916.

Banana plants from the Philippines riddled by *Cosmopolites sordidus*, were reported to be also infested with *Calandra remota* Sharp. In the abstract of this report (see Rev. Appl. Ent. (Ser. A) vol. 4, p. 199) the reviewer has substituted *Polytes mellerborgi* Boh., placing *Calandra remota* Sharp in parentheses.

Notes on this species, under the name *Calandra remota* have appeared in the Proceedings of the Hawaiian Entomological Society as follows:

Vol. 1, p. 113, Giffard took 20 specimens from decaying banana stems on Tantalus.

Vol. 3, p. 269, Giffard took a specimen in beating "ieie" vines.

Vol. 3, p. 388, Bridwell found the larvae feeding in the base of banana stems.

Vol. 4, p. 76, Bridwell reported that specimens collected by Muir in China, Malay Peninsula, Java, Borneo and Amboina belonged to this species.

Vol. 4, p. 464, Swezey found nine specimens in the decaying corm of a banana plant at Kaimuki, and again (p. 472) he took 65 of these weevils from beneath the dried-up leaf sheaths of one banana plant at the same place. These had apparently matured from larvae that had developed in the corm below the surface.

Further Notes on Chrysomyia Megacephala (Fabr.) (Diptera).

BY J. F. ILLINGWORTH.

(Presented by E. H. Bryan, Jr., at the meeting of November 1, 1923.)

I wish to add the following notes on the distribution of this species. In Yokohama during July, 1923, I took four males in a fly-trap, in a sweet shop. Yet, during extensive collecting in this region, in June and July, I got no other specimens, even on exposed carrion; a fact which indicates that this species is rare in this latitude. Collecting in Hokkaido failed to reveal a single specimen, though Dr. Matsumura's extensive collection in the Imperial University at Sapporo contained numerous material, both males and female, from the Ladrone Islands, and a male taken at Baguio, Luzon, P. I., by Prof. C. F. Baker.

In Kyoto I took a single male of this species in a fish market, October 1, 1923. I also found this fly in a collection from India, determined by Brunetti, at the Shimazer Seisachio Specimen Department.

Thus these records extend the range recorded in my original notes on this species (Proc. Haw. Ent. Soc. V. pp. 266-7, 1923), and indicate that Yokohama is the northern limit of this semi-tropical fly.

A New Hawaiian Rhyncogonus (Coleoptera, Rhyncophora).

BY DR. R. C. L. PERKINS.

(Presented by O. H. Swezey at the meeting of June 7, 1923.)

Rhyncogonous saltus n. sp.

Nearly black, though reddish in parts, the funicle joints of the antennae and the tarsi evidently rufescent.

Head basally with distinct punctures, in front of these strigose to about the line of the antennal insertions, sparsely clothed with pale yellowish setae; the eyes quite strongly convex; the first and second funicle joints of the antennae subequal, the first not three times as long as its greatest width, the third much shorter than these, the club longer than the three preceding joints together.

Pronotum very densely, subrugosely punctured, such small spaces as are left between the punctures shining; a very narrow smooth median line, which in some aspects appears like a fine carina, extends practically the whole length of the pronotum. The general clothing of this part is very sparse, but towards the sides it forms a dense band which is more or less interrupted or at least thinner towards the middle.

Elytra narrow, about three times as long as the pronotum, and one and a half times as long as broad, clothed with pale decumbent setae (which do not form a pattern, being generally distributed) and with very sparse erect ones, which are chiefly noticeable on the apical and on the lateral parts; the coarse serial punctures are ill-defined or irregular in outline and between them are scattered minute turbercles or surface granulations; there are also some vague inequalities of the surface which are more or less transverse in direction, but, as happens in other species, there may be individual peculiarities. There is no distinct, sharp edge or carina marking off the pseudepipleural portion of the elytra, and this portion is well clothed in general, no distinct maculations being formed by the setae, though they are less numerous on the lower part. On the apical part of the femora the appressed setae become conspicuously dense, in the case of the front and middle legs on both the outer and inner surfaces, but only on the outer surface of the hind femora. The large basal portion of the abdominal ventral surface is mostly smooth and shining, with copious and distinct punctures; the subtriangular apical segment is very feebly sculptured but conspicuously pubescent, the two small preceding segments being comparatively bare.

Female. Length 8 mm.; width of elytra about 3.5 mm.

This obscure species is placed near *R. extraneus, simplex* and *vestitus,* and bears considerable superficial resemblance to narrow and depauperated examples of *simplex*. Apart from

numerous other distinctions, the value of which is in some cases uncertain owing to the variability of the latter species, while the one above described is at present known only from a single specimen, the ventral abdominal segments afford a good character which is probably quite constant. In *simplex* female the penultimate (exposed) ventral segment is conspicuously hairy, like the apical one, in *saltus* it is nearly bare, like preceding and very unlike the following segment in clothing.

Hab.—Oahu, Waianae Mts., where a single specimen was collected May 9, 1920, by Mr. O. H. Swezey, near the Kolekole Pass, on the native Composite, *Campylotheca menziesii*.

Whence the Termites of Hawaii?

BY THOMAS E. SNYDER.
Entomologist, Bureau of Entomology,
U. S. Department of Agriculture.

(Presented by O. H. Swezey at the meeting of March 1, 1923.)

On a recent visit to the Museum of Camparative Zoology, Cambridge, Mass., through the kindness of Mr. Nathan Banks, I was able to examine a small collection of termites from Hawaii. Among this material were large-sized soldiers of a species of *Neotermes* which may be *Neotermes connexus* var. *major* Sny. I recently described this variety from dealated adults collected at Kaiwiki. The label in the vial of the material from the Museum of Comparative Zoology was merely "Hawaiian Islands."

Very few termites are known from Hawaii; but five species have been described, four being in the more primitive family Kalotermitidae and one being in the intermediate family Rhinotermitidae; no species in the more highly specialized family Termitidae are known from Hawaii. A list of the species of termites of Hawaii showing family relationship and occurrence follows:

Family Kalotermitidae.

Neotermes connexus Snyder	All Islands
Neotermes connexus var. *major* Snyder	Hawaii, Kaiwiki
Kalotermes immigrans Snyder	Oahu, Honolulu
Cryptotermes piceatus Snyder	Oahu, Honolulu

Family Rhinotermitidae.

Coptotermes intrudens Oshima	Oahu, Honolulu

It would be interesting to know whether these termites are native to Hawaii or not. Students of the fauna of Hawaii claim that there is only one native species of termite, namely the mountain form, *Neotermes connexus* Snyder, formerly supposed to be *"Calotermes" castaneus* Burmeister of the United States and the West Indies. *Neotermes connexus* Sny. is a true forest insect, confining itself to the mountain forests, but occurs on all the islands. It is sometimes injurious to living forest

trees but does not cause any extensive dying of trees. *Kalotermes immigrans* Snyder, believed to have been *Kalotermes marginipennis* Latr. of North and Central America and the West Indies, is believed to have been introduced. This species occurs in dead trees and other timbers on the lowlands. Nevertheless it is known to have been present in Hawaii since 1883, which is also the first record of *Neotermes connexus*. *Cryptotermes piceatus* Snyder, believed to have been *Cryptotermes brevis* Walker, has been known to occur in Hawaii only since 1904, and with *Coptotermes intrudens* Oshima, known to occur in Hawaii only since 1913, is responsible for the greater part of the destruction of the woodwork of buildings, furniture and other timber in Honolulu. Both of these termites are supposed to have been introduced into Hawaii and are confined principally to Honolulu, although spreading rapidly.

The species in the family Kalotermitidae occurring in Hawaii are related to species occurring in the United States and the West Indies, whereas *Coptotermes intrudens* is related to a species of *Coptotermes,* namely *formosanus* Shiraki, of Japan and Formosa. It may be that some of these species have been introduced into Hawaii and have since developed into distinct species. However, *Neotermes connexus* and *Neotermes connexus,* var. *major* seem to be native species and I should not be surprised if *Kalotermes immigrans* were also native. A single specimen, possibly a variety of this species, collected at Waikiki is lighter colored, longer, with longer, wider head, and has the pronotum relatively shorter in proportion to its width; the wings are also longer; membrane of wing rugose between median and subcosta. Of course it may be that it has been introduced and it is splitting up into varieties. Another species collected on Hawaii, at Hilo in July, 1900, by H. W. Henshaw, is apparently new. More material is needed to definitely determine whether these are varieties or distinct species.

Recently Claude Fuller has described a species of *Cryptotermes* from Durban, South Africa, which is very close if not identical with *Cryptotermes brevis* Walker of Southern Florida and the West Indies. Fuller named this species *pseudobrevis*. It was confined to one carpenter shop in one locality. Such species of termites living in dry, sound wood may easily become

cosmopolitan through commerce. Strict enforcement of quarantine laws will prevent much of such distribution.

Recent systematic work on termites is giving us concise records on distribtuion. *Reticulitermes flavipes* Kol. is found to occur only in the eastern portion of the United States. *Leucotermes tenuis* Hagen of America includes three other distinct species. *Neotermes castaneus* Burmeister is a definite species of restricted distribution.

May I not make a plea for a more thorough survey of the distribution of termites in Hawaii and the collection of specimens of soldiers with winged forms, if possible! Such specimens can be placed in alcohol and sent to the United States National Museum. Such a survey may enable us to better determine the status and relationship of Hawaiian termites.

A description of the soldier of *Neotermes major* Snyder is appended.

Neotermes major Snyder.

Soldier.—Head light castaneous-brown, darker anteriorly, broad, but longer than broad, fairly flat, but slightly arched, area of epicranial suture slopes to anterior and is slightly depressed, head with scattered long and short hairs. Width of gula at front nearly three times width at center.

Eye spot purplish, elongate (2 mm. long) slanting.

Labrum yellow-brown, broader than long, rounded and with long hairs at apex.

Mandibles black (reddish brown at base), fairly stout, slenderer and incurved at tips; left mandible with two sharp, pointed teeth at middle and a basal molar; right mandible with one sharp, pointed tooth at middle and basal molar.

Antennae light castaneous-brown, 16 segments, pubescent; third segment elongate, clavate, nearly as long as fourth and fifth segments together.

Pronotum yellow-brown, darker rim at anterior margin, broader than head, deeply roundedly concave at anterior margin, corners high anteriorly, sides roundedly narrowed to posterior margin, latter is slightly emarginate; with scattered long hairs.

Legs with tibiae swollen.

Abdomen yellow-brown, with long hairs.

Measurements: Length of entire soldier, 10.5+ (?) mm.; length of head with mandibles, 4.9-5.20 mm.; length of head without mandibles (to anterior), 3.30 mm.; length of left mandible, 1.70 mm.; length of

pronotum, 1.70 mm.; length of hind tibia, 1.80-1.90 mm. (aver. 1.85); width of head, 2.5-2.7 mm.; width of pronotum, 2.8 mm.

Described from three soldiers in the Museum of Comparative Zoology, Cambridge, Mass., in a vial with label "Hawaiian Islands." This soldier is believed from its size, etc., to be the same species as *Neotermes connexus,* var. *major* Snyder, described from dealated adults from Kaiwiki, Hawaii. If so, it is a valid species, not a variety; if not, it is a new species. Two of these specimens from which the description was made are in the Museum of Comparative Zoology, Cambridge, Mass., the other is in the U. S. National Museum, Washington, D. C.

Notes on Insect Pests in Samoa.

BY O. H. SWEZEY.

(Presented at the meeting of November 1, 1923.)

While in Samoa four weeks during September, 1923, every opportunity was taken to make observations on insect pests of economic importance there.

Apparently the most destructive pests are those of the coconut and banana, and they appear to be such as have comparatively recently arrived there from elsewhere, probably from other Islands of the South Pacific.

The worst pest on sugar cane is the borer, the same kind that we have in Hawaii. As cane is grown in Samoa only for thatching the native houses, the damage done by the borer is not taken so seriously as if it were a commercial crop.

Insects on Sugar Cane.

Perkinsiella vitiensis Kirk.

This leafhopper was usually to be found in patches of sugar cane, though not abundant enough to be injurious. In fact, the insects themselves were rather so scarce as to be difficult to find, but their presence was known by the discoloration of the midrib of the leaves where eggs had been deposited. Very few eggs were found anywhere, and I failed to find any that were parasitized. However, a few of the little round exit holes were found which indicate where the egg-parasite *Ootetrastichus* had issued. This was very likely the same species (*Ootetrastichus beatus* Perkins) that occurs in Fiji. The adult parasite oviposits in eggs of the leafhopper. In developing, the parasite larva consumes the leafhopper egg in which it has hatched, it then eats the other two to seven eggs of the same cluster of leafhopper eggs. Having obtained its growth the larva transforms to the pupa and adult in a small cavity in the leaf tissue, and gnaws the tiny round exit hole to make its escape when fully matured. This egg-parasite was introduced from Fiji to Hawaii in 1905 where it rendered valuable assistance in checking the cane leafhopper (*Perkinsiella saccharicida* Kirk.)

occurring there. A single specimen of the egg-parasite was collected in a cane patch on the island of Tau of the Manu'a group, which proves to be the Fijian species mentioned.

Rhabdocnemis obscura (Boisd.).

The cane borer was generally present and quite injurious. In some places worse than others, sometimes scarce and hard to find in cane patches. Often it was easier to find in coconut trees, where its larvae were in the bases of old leafstalks, usually the stubs where leaves had been cut off.

A colony of the New Guinea Tachinid fly parasitic on the larvae of this borer was sent to the Naval Station, Pago Pago, in 1918. I learned that the flies had been liberated in a cane patch at a Samoan village on Pago Pago harbor. As I was not able to find any of the parasites anywhere that I looked, it must have failed to become established. If it had succeeded in establishing, it could have spread quite generally by this time. Other colonies of this parasite have recently been sent in further attempts to establish it there.

Elytroteinus subtruncatus (Fairm.).

A beetle which has been known as the ginger weevil, was found in cane along with the cane-borer in a cane patch on the side of the mountain above Fagasa village. Quite a number of larvae were found, mostly in broken off canes lying on the ground and already somewhat bored by larvae of *Rhabdocnemis obscura*. A few pupae were found which were saved till they matured to the adult beetles. The identity of the species was verified by Dr. G. A. K. Marshall of the Imperial Bureau of Entomology.

Longicorn beetle.

A few larvae of a Longicorn beetle were found in dead canes on the ground in the same cane patch at Fagasa. These were not reared, so their identity is not known. They were probably some dead-wood borer, and not a particular cane insect, probably only attacking dead canes.

Melanitis leda Linn.

On two occasions the larva of this butterfly was found feeding on cane leaves. One of them was reared, thus proving

its identity. It is a green caterpillar, probably a special cane insect, though not numerous enough to be considered a pest. I do not know if it feeds on other plants than cane. It occurs in Fiji, and quite widely distributed in the South Pacific.

Cosmopteryx dulcivora Meyr.

The larva of some small species of moth was found boring in the midribs of cane leaves, fairly common, but not specially injurious. I failed to rear any adults, but it is likely to be the species here given which occurs in Fiji with similar habits.

Mealy bugs: Pseudococcus sacchari and **P. calceolariae.**

Both of these species of mealy bugs are found, the former more common than the latter. Both feed on the cane stalk at the nodes, inside of the leaf sheaths. No parasites were found associated with these, nor ladybeetles feeding on them.

Aleyrodes bergii (Sign.).

In several different places colonies of an Aleyrodid were found on cane. They were usually on the underside of the leaf and near the base, and in quite dense clusters of a few hundred insects and occupying a space of two to three inches along the leaf. They were not numerous enough to cause any significant injury. This species also occurs in Fiji.

Diaspine scale.

In the cane patch at Fagasa, a few stalks of cane were found having a scale on them near the joints. Not numerous enough for injury. The species has not been determined.

Coconut Insects.

Oryctes rhinoceros Linn.

The rhinoceros beetle seems to be considered the most important of all insects that affect the coconut in Samoa. The injury is done by the large adult bettles feeding and burrowing in the growing crown of the coconut tree, where they may cause such injury as to result in the death of the tree, or they may only mutilate the undeveloped leaves so that they cannot become fully developed and of proper service to the tree, or it may be that the undeveloped fruiting clusters are so much

injured as to prevent the bearing of nuts. The appearance of the newer mutilated leaves serves to indicate when and where the beetle is prevalent. The larvae or grubs are not injurious but feed in dead and rotting stumps and logs.

Searching out these grubs and destroying them is the chief control measure being practiced. It seems to be quite effective when persistently and thoroughly carried out. One day per week is designated as "beetle day," on which the natives are required to make special search for these grubs. Many thousands of them are thus found by chopping up old logs and stumps. Their eggs are also found in this way, and a few of the beetles themselves, all of which are destroyed. Much benefit is derived in this way, but the work would be greatly facilitated if the coconut groves were kept free of the native jungle of brush and vines that has such a tendency of rapidly choking up the space beneath the coconut trees. On account of this undergrowth there is great difficulty in finding the breeding places of the beetles and many will escape detection and thus enough grubs go through to maturity to keep the beetle continuously going.

Rhabdocnemis obscura (Boisd.).

The sugar-cane borer is found quite commonly in coconut trees. The beetles may be found behind the bases of the leaves where they can readily hide among the fibrous matter, but the grubs were usually found in the bases of the leafstalks, and mostly in those that had been cut off, leaving a stub remaining on the tree. These cut-off ends provide a place where the adult beetles could conveniently lay their eggs, which accounts for the grubs being more often found in such positions. On account of this habit of feeding in these places, this weevil is not of important injury to the coconut trees.

Diocalandra taitensis (Guer.).

The Tahiti coconut weevil was found quite abundantly in places. It is much smaller than the sugar-cane borer. Its larvae feed in the edges of the lower part of the leaf stalk, and as it is the older leaves that are most often attacked, they are not significantly injurious to the trees. They, too, are likely to be more abundant in stubs of cut-off leaves.

Promecotheca reichii Baly.

This is a Hispid beetle whose larvae are leaf-miners in the leaflets of coconut. The egg is laid on the surface of the leaf, and the young larva, on hatching, bores into the leaf and feeds on the inner green part of the leaf, and producing a dead spot on the leaf where the green matter has been eaten away. The larva transforms to a pupa and eventually to the adult beetle within the mine in the leaf. This was not observed to be abundant enough to be particularly injurious.

Leaf Caterpillar.

Everywhere the coconut leaves showed evidences of the feeding of some insect which ate off the surface in small spots, leaving one epidermis of the leaf and giving the appearance of numerous small dead spots on the leaflets. No insects were found actually doing this eating, but it was considered as being the work of caterpillars of some small moth which was out of season at the time I was there. I thought at the time that the appearance of the leaves was different from that caused by the little moth, *Levuana iridescens,* which injures coconut leaves so badly in Fiji.

Graeffea minor Br.

Stick insects were found feeding somewhat on coconut leaves in a few places. In feeding they consume the whole substance of the leaf, so that the leaflets have ragged edges, or may even be eaten down to the midrib. A larger species, *Graeffea cocophaga* (Newp.), is also said to feed on coconut leaves, but I failed to find any of these. The damage by these insects did not seem to amount to much.

Chrysomphalus rossi (Mask.).

This scale insect was found frequently on coconuts, occurring on or beneath the scales at the base of the nuts, also on other parts of the tree. It did not seem to be particularly injurious.

Scholastes bimaculatus Hendel.

This fly appears to be attached to the coconut, but perhaps not as a pest, as it apparently breeds in decaying nuts. The

fly is usually seen on fallen nuts lying under the trees. What I considered their eggs were found by thousands beneath the scales at the base of immature coconuts lying on the ground, that had fallen off accidentally by the wind, or had been partially eaten by the flying fox, which damages the young nuts on the trees a good deal. I also found very numerous small pink maggots feeding in the decaying husk of similar nuts lying on the ground, which I took to be the maggots of this fly. However, these conclusions are not to be given too much importance. Further observations are necessary to fully learn the life history and habits of the fly and its exact relations to coconuts.

Termites.

A species of termite that is very abundant in the forests of Samoa, builds large, black, rough-surfaced nests on the trunks of trees from one to ten feet or more from the ground. They feed in the trunks, also build narrow covered runs about on the surface of the tree trunk, often extending to a considerable elevation in the tree. Beneath these runs the termites feed on the bark.

Coconut trunks frequently bear these termite nests. A favorite position for the nest being at one of the numerous notches that have been cut into the trunks by the natives to facilitate climbing the trees for the nuts. Besides providing a place for the entrance of termites to the trunk, these notches also present opportunities for decay to set in which diminishes the productivity of the tree and shortens its life. This phase of it is probably more detrimental than the injury by the termites, and it seems to me that this practice of notching the trees should be discouraged.

Banana Pests.

Cosmopolites sordidus (Germ.).

The banana weevil was found in a number of places. Perhaps it has only lately become established and not yet generally spread. The larva of this beetle is a fat, white, legless grub which bores in the corm and base of banana stems. The adult is a black snout-beetle and may be found in the same places

and beneath the dried leaf bases at the base of banana stems. This pest is very destructive to bananas where it occurs in Fiji, Queensland, Java and probably most of the groups of islands between there and Samoa. Where numerous in the base of banana stems these are weakened and may easily fall over, or the plant prevented from normal growth and fruiting, and the young suckers may be entirely killed. This pest has become very serious in Fiji and it is very difficult to devise satisfactory methods of control. It is likely to increase to that condition in Samoa.

Nacoleia octasema Meyrick.

The banana scab moth is generally prevalent. The caterpillars of this moth feed among the flowers and the green bananas on the bunch. Where they feed on the surface of the young growing bananas it does not always prevent their growing to normal size, but the surface where eaten assumes a scabby appearance which is detrimental to the sale of the fruit. The bunches, too, are unattractive where littered up with the black frass from the caterpillars.

This pest occurs from Java to Queensland, Solomon Islands, and to Fiji and Samoa, and no doubt it occurs at all intervening islands. I think that it has not been previously reported in Samoa, and may be of somewhat recent introduction there. In Java, dusting with pyrethrum powder is said to be effective in controlling the pest. The pyrethrum is mixed one part to three parts of sifted wood ashes or lime, and dusted into the opening flower cluster or among the small growing bananas by means of a syringe-like duster.

Papaia Fruit-fly.

Dacus xanthodes Broun.

This fruit-fly was reared from immature fruits of papaia at Amauli towards the east end of Tutuila. I did not find it generally attacking papaias, but it is not confined to papaia as it has been reared from guavas and granadillas. Fruit-fly maggots were found in alligator pear, and in several kinds of native fruits in the forest, but none of these were reared, so we do not know if they were this species or other species of fruit-flies.

Taro Insects.

Chaerocampa celerio (Linn.).

The larvae of this medium-sized hawkmoth were occasionally found feeding on the leaves of taro, not numerous enough to be considered injurious, however. It occurs from India to Java, Borneo, Australia, and Fiji. The large, green caterpillars with a horn at the tail end may be readily picked off and killed when noticed.

Megamelus proserpina Kirk.

This is a small leafhopper found on the underside of the leaves, and often quite numerous though not specially injurious. It occurs in Fiji, Java, the Philippines and probably intervening regions.

Several other kinds of leafhoppers were collected on taro leaves, but were not considered as particularly attached to taro the same as *M. proserpina* is.

Aphidid.

An undetermined plant louse was also found on the leaves of taro, but not causing serious infestations.

Insects of Cucurbits.

Glyphodes indica Saund.

The larvae of this widely spread leaf-roller moth were occasionally found on cucumber vines, but in no case were they numerous enough to be considered a pest.

Aulocophora fabricii ?.

A leaf-beetle probably of this species was quite abundant on squash and pumpkin vines.

As nearly all of the insects above mentioned do not occur in the Hawaiian Islands, and as some of them are serious pests where they are, we may consider ourselves fortunate if they can be kept from reaching our islands.

Of the ten insects on sugar-cane mentioned, only three are at present infesting cane in Hawaii, the borer and the two mealybugs. Some of the others, although not serious pests on cane

in Samoa, might possibly become pests if they reach Hawaii, the same as the leafhopper from Australia became such a bad pest, whereas it was not a bad one in Australia.

The most of the coconut insects are not present in Hawaii either. The leaf-roller that we do have, however, causes the leaves to look more dilapidated than they do in Samoa with several kinds of insects feeding on them. Our one pest on coconut leaves is too much, we surely do not want any more.

The banana borer and the banana scab moth would ruin the banana industry in Hawaii if they should gain access here, and there is no telling what the papaia fruit-fly might do here, as it has been reported bred from pineapples from Fiji, though not fully substantiated.

As Samoa is the closest tropical neighbor from which steamers are coming regularly, it is the most likely place from which some of the already widely distributed tropical insect pests could accidentally reach Hawaii, and makes it urgent that a constant lookout be maintained to prevent as long as possible any more such pests arriving here.

Descriptions of New Chalcid-Flies from Hawaii and Mexico (Hymenoptera).

BY P. H. TIMBERLAKE.

(Presented at the meeting of December 6, 1923.)

The types of the Hawaiian species described in this paper are deposited in the collection of the Hawaiian Entomological Society, and those of the two Mexican species of Encyrtidae are in the collections of the Hawaiian Sugar Planters' Experiment Station.

ENCYRTIDAE.

Acerophagus debilis n. sp. Fig. 1.

This species is most like *notativentris* (Girault) among previously described species, and differs in the position and arrangement of the ocelli, in the much more clavate antennae, and by lacking a fuscous mark on the abdomen of the male.

Female. Head of the same general shape as in other North American

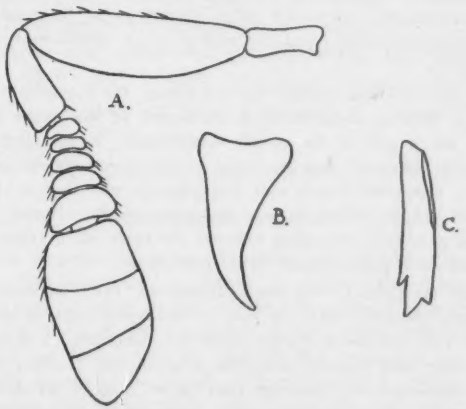

Fig. 1. *Acerophagus debilis.* A. Antenna of female. B and C. Mandible in dorsal and frontal views.

species of the genus, but rather thicker fronto-occipitally than in most species; in dorsal view fully rounded on the sides and in front; in side view thickest opposite the anterior ends of the eyes, the planes of the

frons and face meeting in slightly more than a right angle, the face somewhat shorter than the frontovertex; as seen from in front, distinctly wider than long, but not greatly so, the sides of the head rounded, the oral margin rather broad and subtruncate. Frontovertex about twice as long as wide, the orbits parallel; ocelli in a right-angled triangle, the anterior ocellus placed at the posterior third of the frontovertex, the posterior pair about their own diameter from the occipital margin and much closer to the eye margin; eyes rather smaller than in *notativentris*, somewhat less than twice as long as wide, widest near the anterior end; cheeks distinctly shorter than the width of the eyes; face with a rather shallow, semi-oval scrobal impression, the sides of the impression sloping; the bottom largely filled by the prominence between the antennae, which is about one-half longer than wide and reaches upward to the ocular line; the scrobes proper occupy the rather narrow space between the sides of the impression and the prominence, and converge and unite above in a curve. Antennae (Fig. 1a), inserted as usual close to the oral margin and far apart, more strongly clavate than in other species; scape rather wide, pedicel almost as long as the funicle and considerably narrower at apex than the scape; funicle joints all transverse and increasing in width, the fifth joint about twice as long and twice as wide as the first; club broadly oval, somewhat obliquely truncate at apex and as long as the funicle and two-thirds of the pedicel combined. Mandibles (Fig. 1b and c) of the usual type, with the outer tooth far basad, and the middle tooth considerably larger than the inner tooth.

Thorax and abdomen normal for the genus, the ovipositor sheaths protruded for a distance about equal to one-fourth of the length of the abdomen, or to the length of the middle tibial spur. Wings narrow, the disk finely, densely pubescent, but the setae in the basal area distinctly coarser and sparser; speculum narrow and only slightly widening as it approaches the posterior margin which it does not quite reach; stigmal vein narrow at base and gradually enlarging towards the apex, about twice as long as the marginal and postmarginal veins combined.

Sculpture throughout very finely alutaceous, the frontovertex not perceptibly more granular than the rest of the body; both it and the mesonotum with very minute, scattered setiferous punctures. Pubescence on the head very short and inconspicuous, the setae on the frontovertex nevertheless rather numerous and retrorse; eyes rather densely pubescent, the setae very short and erect; pubescence of mesonotum moderately thick and rather dark colored, quite uniform in distribution on the scutum, axillae, and scutellum.

Color of head, thorax, and abdomen about capucine yellow (Ridgway), the face and underparts of the thorax slightly paler with the scape, club and legs nearly unicolorous; remainder of antennae somewhat dusky; apex of ovipositor sheaths blackish; wings hyaline, the veins very pale brownish.

Length of body (0.436 to) 0.721; length of head, 0.235; width of head, 0.275; thickness of head fronto-occipitally, 0.151; width of frontovertex,

0.099; length of antenna, 0.339; width of mesoscutum, 0.240; length of fore-wing, 0.587; width of fore-wing, 0.226; length of exserted part of ovipositor, 0.073 mm.

Male. Similar to the female, but the frontovertex is proportionately wider, or not quite twice as long as wide, the anterior ocellus placed only a little behind the center; antennae slenderer, the club solid; the abdomen smaller, strongly depressed, ovate, and about two-thirds as long as the thorax.

Coloration paler, the vertex, notum of thorax and abdomen light orange-yellow (Ridgway), the frons shading into paler yellow anteriorly; the face, underparts of thorax and the legs pale yellowish; antennae pale yellowish, but with the fifth funicle joint and base of the club fuscous and the remainder of the club yellowish white.

Length of body (0.396 to) 0.533; length of head, 0.203; width of head, 0.214; thickness of head fronto-occipitally, 0.113; width of frontovertex, 0.085; length of antenna, 0.290; width of mesoscutum, 0.203; length of fore-wing, 0.521; width of fore-wing, 0.212 mm.

Described from 3 females (holotype and paratypes) reared from *Pseudococcus brevipes* Ckll. (*bromeliae* of authors) on pineapple, Amatlan, Vera Cruz, Mexico, May 20, 1922; 1 male (allotype) from the same host on *Tillandsia*, El Potrero, Vera Cruz, July, 1922; and 1 male (paratype) reared November 1, 1922, from the same host from Cuernavaca, Morelos, Mexico, all collected by H. T. Osborn.

Type No. 1142, Hawaiian Sugar Planters' Experiment Station.

Synaspidia new genus.

This genus appears to be closely allied to the *Blepyrus*, *Aenasius*, *Archinus*, and *Zaomma* group of genera. It differs from *Blepyrus*, *Eurythopalus* and close allies in having the head non-menisciform and without large punctures; from *Archinus* it differs in having the post-marginal vein well developed and longer than the stigmal, the ovipositor not protruded, the cheeks not unusually short, etc. From *Zaomma* it differs in having the eyes smaller, the frontovertex only moderately narrowed, the facial impression not horseshoe-shaped, the club less strongly enlarged, the pedicel not very short, the antennae unicolorous, etc. On the whole, it seems to agree most closely with *Zaomma* which, unfortunately, is known to me only by description.* It agrees with *Zaomma* in having the face inflexed,

* I have since examined the type of *Zaomma argentipes*, which unfortunately has been badly mutilated, the head being in fragments on a slide. *Zaomma* has the thorax strongly convex above, the axillae rather well separated and slightly elevated above the scutellum; the latter is

with the frons prominent, the antennae strongly clavate, the marginal vein very short, the post-marginal and stigmal veins both long. The axillae and scutellum are closely fused in *Synaspidia* as in *Chalcaspis* and *Metaphaenodiscus*, but both of those genera have the head menisciform.

Female. Head much wider than long, thick fronto-occipitally with the face strongly inflexed and the frons prominent; in side view, appearing distinctly triangular, with the planes of the face and frontovertex about equal in length and meeting in a right angle; eyes large, very broadly oval, largely dorsal and latero-dorsal in position; frontovertex narrow or about four times as long as its narrowest part, the ocelli in an acute angle; face with a large scrobal impression which is subtriangular above; cheeks rather short or about one-half as long as the width of the eyes. Antennae inserted rather far apart close to the oral margin; scape slender, slightly widened at the middle, and reaching a little beyond the scrobal impression; pedicel of about normal length and shape, and rather longer than one-half of the funicle; flagellum short and strongly clavate, the funicle six-jointed and rapidly increasing in width distad, the first joint nearly twice as wide as long, the sixth about thrice as wide as long; club broadly oval, about one-half longer again than wide, rather longer and much wider than the funicle, three-jointed with the apical joint obliquely truncate beneath. Mandibles slender in frontal view, expanding at apex and with three acute teeth, of which the middle one is much the largest; base of mandible expanded in a plane at right angles with the apex. Palpi short, the maxillary pair four-jointed, the labial pair three-jointed.

General form of body short and robust, the thorax about one-third longer again than wide, pronotum largely concealed by the head, the collar not very strongly arcuate; mesoscutum nearly thrice as wide as long, its posterior margin slightly sinuate on each side of the middle; axillae but little wider than long, not especially acute at the inner angle and rather widely separated medially; they are also closely fused to the scutellum, the separating suture being only weakly indicated; the consolidated scutellum and axillae as a whole is about as long as wide at the base, and the apex is well rounded. Abdomen at base as wide as the thorax and somewhat shorter, subtriangular in dorsal view with the apex subtruncate; the dorsum rather deeply concave, the venter subvomeriform; vibrissal plates situated near the middle of the lateral margins; ovipositor wholly enclosed by the ventrites and the sheaths not appreciably protruded.

Legs short and normal in structure; middle tarsi with the usual tapering form and considerably stouter than the hind pair. Wings small and

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pulvinate, longer than wide, the apex rather broadly rounded, the sides and apex high and declivous. The marginal vein is about three times longer than wide; the stigmal short, slender, curved upward, a little over one-half the marginal; the postmarginal shorter than the stigmal, being short and triangular.

not reaching much beyond the apex of abdomen; the disk moderately densely pubescent, the speculum very distinct, the basal area with sparser, somewhat coarser but more hyaline setae, the costal cell pubescent except next to the vein; marginal fringe very short but dense; submarginal vein reaching to the middle of the costal margin, almost straight and somewhat thickened near its apex; marginal vein quadrate-punctiform; the stigmal rather long, straight and with a slender, short spur at apex; postmarginal vein somewhat longer than the stigmal, the angle between these two veins acute; costal cell of hind wings moderately wide and extending to the hooklets.

Head and thorax with a very finely reticulate, moderately lustrous surface, the face more lustrous and with a considerably coarser reticulation; frontovertex with fine pin-punctures. Pubescence of head and body short, fine, appressed, dark-colored and inconspicuous; setae of the mesoscutum seriately arranged, those on the axillae and scutellum sparser yet rather numerous. Coloration metallic.

Male. Very similar to the female, but the antennae are only eight-jointed, the funicle with five joints, and the club solid.

Type of the genus: *Synaspidia pretiosa* n. sp.

Synaspidia pretiosa n. sp. Figs. 2 and 3.

Female. Head with the whole dorsal surface sloping forward and downward nearly at right angles with the longitudinal axis of the thorax; as seen in frontodorsal view, it is strongly rounded on the sides, subtruncate in front, the occipital margin broadly roundly emarginate; as seen from in front, distinctly wider than long, strongly rounded on the sides, with the cheeks gibbously convergent towards the rather small mouth. Occiput rather deeply concave, its dorsal margin very acute; eyes large, hardly a third longer than wide, their outline strongly rounded except at the inner orbits, their posterior margin contiguous to the occiput; frontovertex narrowest at the anterior ocellus, slightly widening anteriorly and more abruptly widened at the posterior ocelli; ocellar triangle moderately acute, the distance between the posterior pair of ocelli equal to about three-fourths of the distance between either and the anterior ocellus; the posterior pair contiguous to the eyes and removed about one-half their own diameter from the occipital margin. Scrobal impression large and occupying nearly the whole face, but rather shallow, indefinitely bounded on the sides, but definitely limited above by the angle between frons and face; the prominence between the antennae low and weakly convex, oval in outline and about twice as long as wide; the scrobes proper in the form of linear grooves on each side of the prominence, but uniting above and forming the bottom of the whole impression in its dorsal half. Antennae and mandibles as in figure 2; maxillary palpi short, thickest at apex of the second joint, the first two joints nearly equal in length, the second about one-half longer than thick, the third distinctly smaller than

the second, although hardly shorter on its outer margin, the fourth joint cylindrical and tapering in apical half, about as long as the first two joints combined; labial palpi very short, the middle joint transverse, the apical joint somewhat the longest, conical, and hardly more than twice as long as thick.

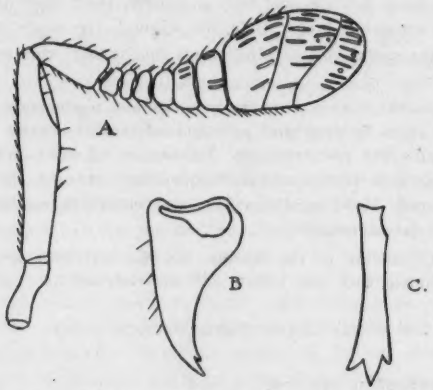

Fig. 2. *Synaspidia pretiosa.* A. Antenna of female. B and C. Mandible in dorsal and frontal views.

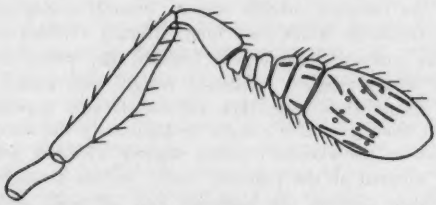

Fig. 3. *Synaspidia pretiosa.* Antenna of male.

Thorax moderately convex above, distinctly wider than the depth dorsoventrally; the axillae and scutellum very strongly depressed and lying in one plane, the apex of the scutellum very briefly elevated, yet abruptly declivous at the margin, the latter very finely acutely rimmed, just inside of which is a delicate submarginal furrow. Propodeum short and very transverse, considerably longer at the sides and there declivous, the basal margin finely carinate; on both sides of the middle this basal carina branches, the branch on each side curving backward and outward towards but not reaching the posterior margin halfway between the foramen of the petiole and the lateral corner; just inside of the spiracles on each side

another fine carina runs straight backward to the edge of the declivous portion of the propodeum, where it branches, the inner branch connecting with the submedian carina, the outer branch extending towards the posterior lateral corner of the propodeum, still another branch is given off anteriorly and runs forward to the spiracle; spiracles rather large, oval and contiguous to the basal margin of the propodeum.

Reticulation of head and thorax very fine and delicate, but somewhat coarser and more evident on the face; frontovertex with two longitudinal rows of pin-punctures on either side of the median line, and an orbital row of much finer punctures on each side; mesonotum with numerous seriately arranged, minute setigerous punctures similar to the orbital punctures of the head, and becoming sparser on the axillae and scutellum; prepectal plates as coarsely reticulate as the face; mesopleura with an extremely fine reticulate shagreening; propodeum except for the carinae described above is mostly smooth; reticulation of the abdomen rather coarser and more evident than that of the face and with the lines mostly transverse, especially on the basal tergite.

Eyes with an extremely short sparse pubescence, not apparent except under high magnification; pubescence of head and body short, recumbent and dark-colored, antrorse on the frontovertex and retrorse as usual on the thorax, that of the axillae and scutellum becoming sparser and the apex of the scutellum with two considerably longer setae; sides of the propodeum behind the spiracles with a very fine whitish pubescence, which, however, is not conspicuous; pubescence along the sides and at the apex of abdomen sparse, but somewhat longer than that of the thorax.

General color moderately lustrous black; head with a rather weak bluish-green luster, the face more lustrous and greenish; mesoscutum usually somewhat bluish, but sometimes like the axillae and scutellum, which are darker and more aeneous; lateral posterior corners of the propodeum with a rather bright bluish luster; abdomen mostly like the scutellum, but the apical tergite has a brighter and greenish luster; antennae and legs concolorous with the body, but less lustrous, the tarsi mostly yellowish, with the last three joints of the hind pair, the last joint and the spines on the plantar surface of the middle pair fuscous, the front pair more or less dusky yellow, the spur of the middle tibiae yellow; wings hyaline, the disk with a very faint indefinite fuscous cloud beneath the stigmal vein, the veins brownish.

Length of body (1.16 to) 1.32; length of head, 0.497; width of head, 0.601; thickness of head fronto-occipitally, 0.325; width of vertex at anterior ocellus, 0.085; length of antenna, 0.662; width of mesoscutum, 0.561; length of fore-wing, 1.027; width of fore-wing, 0.502 mm.

Male. Very much like the female in most respects and the following differences appear to be the most important: Vertex widening a little more at and behind the posterior ocelli, somewhat protuberant and rather more dully shagreened; ocelli slightly larger and in a less acute triangle;

eyes considerably more densely and conspicuously pubescent; antennae (Fig. 3) with the flagellum proportionately shorter, the funicle only five-jointed, the club solid, but in general shape agreeing with the female; the scape with a narrow ventral exfoliation from the apex to a little more than three-fourths of the length excluding the radicle, this exfoliation in the female being much smaller and not reaching to the middle; abdomen somewhat wider than long, rounded at apex and hardly more than one-half as long as the thorax, therefore, considerably smaller, more depressed than in the female, and with the venter not at all vomeriform.

Length of body (0.825 to) 1.15; length of head, 0.441; width of head, 0.507; thickness of head fronto-occipitally, 0.261; width of vertex at anterior ocellus, 0.094; length of antenna, 0.542; width of mesoscutum, 0.499; length of fore-wing, 0.905; width of fore-wing, 0.457 mm.

Described from 13 females, 8 males, reared from *Pseudococcus brevipes* Ckll. (*bromeliae* of authors) collected in Mexico by Mr. Osborn, as follows: 1 female (holotype) reared August 10, 1922, from its host on *Tillandsia*, El Potrero, Vera Cruz; 12 females, 3 males (paratypes), reared from mealybugs on *Tillandsia* and other Bromeliaceous plants, El Potrero, on July 31, and during August, 1922; 2 males (allotype and paratype) with the same data, but collected in March, 1923; 3 males (paratypes) from mealybugs on a Bromeliaceous plant, Rio Seco, Vera Cruz, March 15, 1923.

Type No. 1143, Hawaiian Sugar Planters' Experiment Station.

Zeteticontus perkinsi n. sp. Fig. 4.

Female. Head moderately thick fronto-occipitally with the face slightly inflexed; in dorsal view appearing semi-circular with the occipital outline broadly and roundly emarginate; in side view appearing thickest fronto-occipitally at the anterior ends of the eyes, the planes of the face and frons meeting in an angle of distinctly more than 90 degrees; in frontal view appearing as wide as long and nearly circular in outline with the broad oral margin truncate. Occiput moderately deeply concave; eyes of medium size, broadly oval, about one-third longer again than wide, posteriorly contiguous with the occipital margin, the inner orbits somewhat diverging anteriorly; frontovertex occupying about a third of the total width of the head, and about one-third longer than its own width at the anterior ocellus; ocelli rather large, disposed in what is slightly more than a right-angled triangle, the posterior pair somewhat less than their own diameter from the occipital margin, and not more than one-half as far from the margin of the eyes. Cheeks in side view of head rather wider than long and distinctly shorter than the width of the eyes, the genal suture very obscure; facial impression subcircular, extending for about

one-half of its length above the ocular line, the prominence between antennae convex, about twice as long as wide and reaching somewhat above the middle of the facial impression; the scrobes proper broadly united above, the sloping walls of the facial impression extending far laterad of them (in *planiscutellum* the facial impression is distinctly triangular, rather shallow and strictly co-extensive with the scrobes proper, and the antennal prominence is about as wide as long); antennal sockets situated rather far apart near the oral margin, the distance between them somewhat less than the distance from either to the nearest part of the eyes, and slightly more than twice as great as the distance from either to the oral margin.

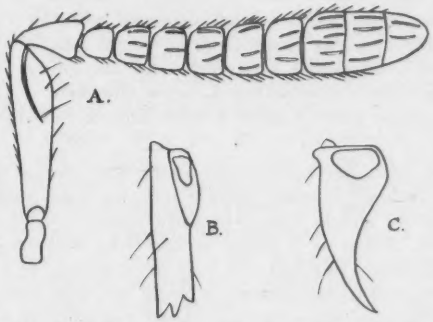

Fig. 4. *Zeteticontus perkinsi*. A. Antenna of female. B and C. Mandible in frontal and dorsal views.

Antennae moderately short and distinctly clavate (Fig. 4a); scape slightly expanded beneath and widest at about one-half way between the middle and apex; pedicel equal in length to the first two funicle joints combined, wider at apex than the following joint and slightly narrower than the second funicle joint; first funicle joint much the smallest, about as wide as long, the following joints increasing in width and slightly in length, the next two not much wider than long, the sixth about one-half wider again than long and nearly twice as wide as the first; club oval, a little tapering to the rounded apex, somewhat longer than the three preceding joints combined, its three joints nearly equal in length, the basal one broadest; flagellum except the first funicle joint provided with rather numerous but not at all crowded linear sensoria, the whole flagellum also with very numerous short reclinate setae, and similar, somewhat longer setae occur also on the scape and pedicel. Mandibles (Fig. 4b and c) and palpi as in other species of the genus; the two outer teeth of mandibles equal, both rather shorter than in *planiscutellum*, and the inner tooth placed considerably closer to the apex than in that species, the mandible, therefore, more similar to *abilis* as figured by Silvestri.

Thorax nearly twice as long as wide, moderately convex and not quite

so thick dorso-ventrally as wide; pronotum strongly arcuate; mesoscutum much longer medially than at the sides and somewhat less than twice as wide as long, its posterior margin nearly transverse or only slightly produced medially; axillae over twice as wide as long and very acute medially, their inner tips slightly separated or covered by the mesoscutum; scutellum nearly as long as the scutum, the greatest width about equal to the length, the width decreasing from near the base to the rounded apex, the sides low yet abruptly declivous, the disk moderately convex; propodeum extremely short in the middle, but strongly lengthening and becoming declivous towards the sides.

Abdomen a little shorter than the thorax, triangular in outline, with the basal angles rounded and strongly depressed with the dorsum a little sunken in; vibrissal plates situated on the lateral margin a little before the middle; ovipositor sheaths barely protruded, the spicula (in the unique type) lies free from the sheaths and curves downward and a little forward from the point where it issues a short distance from the apex of the venter.

Legs rather short, the middle tarsi considerably stouter than the hind tarsi, but not distinctly tapering towards apex, the basal joint about equal to the spur of the middle tibiae and about equal to the following three joints combined. Wings as in *abilis*, as figured by Silvestri except in the following particulars: Marginal vein fully twice as long as wide, the stigmal practically equal to the marginal in length and much more expanded at apex and constricted at base than in *abilis*, the post-marginal about one-half as long as the marginal; the row of about seven coarse setae guarding the proximal side of the speculum extends more than three-fourths of the distance towards the opposite margin; the second row of finer setae situated just proximad extends for the same distance as the first row and parallel with it, and there is another row of setae lying beneath and parallel with the submarginal vein; the discal pubescence beyond the speculum is moderately dense and fine, and the marginal fringe is extremely short, but dense.

Head with very fine reticulations transversely arranged between the anterior corners of the eyes and just above the facial impression arranged in lines conforming to the rounded margin of the impression, and in this manner extending downward and forward on the face towards the cheeks; the dorsal and anterior orbits of the eyes with a row of pin-punctures, which become gradually smaller and obscurer anteriorly; frontovertex provided also with two other curved rows of pin-punctures, beginning close to the orbital row on each side near the anterior part of the frons and curving backward to join together in a loop behind the anterior ocellus. Mesoscutum with equally fine scaly reticulations producing a somewhat rougher effect than on the head and with numerous seriately arranged minute setiferous punctures; axillae appearing smoothish, yet with an extremely fine reticulation, the scutellum smooth and highly polished; propodeum smooth except for a small longitudinally shagreened median area, and provided with a distinct median carina, the posterior margin also carinate,

pleura distinctly reticulate throughout except on the metapleura; abdomen apparently smooth throughout.

Frontovertex with mostly antrorse short setae arising from the pin-punctures, the lower face and cheeks with similar finer setae; eyes with numerous but not dense short erect setae; posterior margin of pronotum with a row of setae about like those on the scutum; the seriately arranged setae of the scutum rather coarser and longer than those on the frontovertex, the transverse row on posterior margin containing about fourteen, and the median longitudinal rows about six or seven setae; scutellum with about thirteen pairs of setae on the basal two-thirds, which strongly increase in size from the base towards the apex; the latter evidently provided with another pair of setae, which are broken off in the type, although their position is indicated by punctures; propodeum with a small tuft of fine short setae on the lateral margins; abdomen with fine setae along the sides and more numerous setae at apex.

General color aeneous black; the head, except most of the face, with a rather weak dark bluish-green luster, the pronotum and mesoscutum with a similar somewhat more greenish luster; facial impression, axillae, scutellum, and abdomen much more lustrous and with green, brassy, and dark purplish reflections; tegulae and underparts of thorax shining piceous with a metallic luster only on the pro- and metapleura. Scape dark brown, the pedicel and flagellum blackish. Legs shining piceous, with the tips of the front and middle femora somewhat paler or brownish; trochanters, apical third of front tibiae, middle tibiae except about basal third and the tarsi, except apical joint of hind pair and apex of last joint of the other pairs, brownish yellow. Wings entirely hyaline, the veins brownish yellow, with the marginal vein a little darker. Pubescence of body wholly dark colored.

Length of body, 1.36; length of head, 0.417; width of head, 0.443; thickness of head fronto-occipitally, 0.259; width of vertex at anterior ocellus, 0.160; length of antenna, 0.742; width of mesoscutum, 0.429; length of fore-wing, 1.183; width of fore-wing, 0.523 mm.

Described from one female (holotype), collected in Honolulu in 1906 by Dr. Perkins. The following note by Dr. Perkins is attached to the specimen: "*In horto meo.* Not previously seen by me." The species has not been taken since, and there is, therefore, some doubt that it has become established in the Islands.

APHELINIDAE.

Aphelinus maidis n. sp. Fig. 5.

Female. Head of the usual shape, wider than the thorax, as seen from above nearly three times as wide as thick fronto-occipitally, as seen from in front much wider than long; frontovertex only a little longer than wide

and somewhat narrowing forward; ocelli in an obtuse angle, the posterior pair about their own diameter from the occipital margin and somewhat more distant from the margins of the eyes; facial impression moderately deep, with sloping sides, the bottom occupied by the triangularly shaped, barely convex prominence, which reaches from the antennal sockets nearly to the dorsal end of the impression. Antennae (Fig. 5) inserted moderately far apart close to the oral margin; scape about four times or a little more as long as wide; pedicel about one and two-thirds times longer than the first two funicle joints combined; the latter equal, and about one-half wider than long; third funicle joint over twice as large as the preceding joint, somewhat wider than long and about one-fourth as long as the club; club narrowly oval, as long as the pedicel and funicle combined and two and one-third times longer than its own width. Mandibles with an acute outer tooth and a broad inner truncation, the ventral or outer edge provided also with a strong tooth-like spine or lobe halfway between the base and apex. Maxillary palpi two-jointed, the basal joint hardly longer than thick, the apical joint about thrice as long; labial palpi two-jointed, both joints about twice as long as thick, the apical joint a little shorter and slenderer. Thorax and abdomen practically as in related species, such as *mali, nigritus,* etc. Wings fully developed and with seven oblique rows of coarser setae proximad of the speculum, the basal fourth of the disk bare.

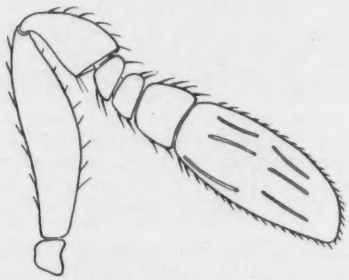

Fig. 5. *Aphelinus maidis.* Antenna of female.

Head very finely, delicately shagreened with reticulations and moderately shiny, the frontovertex with numerous fine shallow setiferous pinpunctures; thorax and abdomen moderately shiny, or about as in *nigritus,* and rather less shiny than in *mali;* the thorax with extremely fine uniform reticulations, the abdomen apparently smooth. In the pubescence of the head and body there appears to be not much difference between this and related species, but the vertex has two pairs of setae, which are considerably coarser than the other setae of the frontovertex; one of these four setae is placed behind each one of the posterior ocelli, and each of the

other pair is placed at the posterior corner of the vertex close to the occipital margin.

General color black, but the head and abdomen may be more or less fuscous brown, the base of abdomen more or less distinctly yellowish, although in many cabinet specimens appearing wholly dark. Mandibles pale brown; antennae dusky yellow; legs pale yellow, the front femora on dorsal side and front tibiae except at apex slightly brownish; middle coxae at base, hind coxae, middle and hind tibiae fuscous to blackish, the apical half of the middle femora more dilutely fuscous; tarsi, especially beneath, more brownish-yellow than the other paler parts of the legs, and the apex of the apical joint fuscous. Wings hyaline, but faintly tinged with fuscous, especially beneath the marginal and stigmal veins; the veins yellowish.

Length of body (0.554 to 0.990), 0.903; length of head, 0.276; width of head, 0.386; thickness of head fronto-occipitally, 0.191; width of vertex at posterior ocelli, 0.151; length of antenna, 0.363; width of mesoscutum, 0.358; length of fore-wing, 0.858; width of fore-wing, 0.396 mm.

Male. Very similar to the female and distinguished with difficulty in case of dry specimens, but averaging considerably smaller in size and with the wings often a little clearer.

Length of body, 0.533 to 0.811 mm.

Described from the following material: 32 females, 22 males (holotype, allotype male, and paratypes), reared from *Aphis maidis* Fitch, in Honolulu, December, 1919, to February, 1920 (Timberlake); 1 female (paratype) reared from *Aphis maidis* on grass, Ewa Plantation, Oahu, May 19, 1922 (Timberlake); 2 females, 1 male (paratypes), from same host on corn, Manoa Valley, Oahu, April 10-11, 1923 (Timberlake); 2 females, 2 males (paratypes), collected on sugar-cane, Mountain View, Hawaii, January 21, 1918 (Timberlake); 8 females, 6 males (paratypes), reared from *Aphis sacchari* Zehntner on sugar-cane, Honolulu, August 18-25, and September 13, 1916 (Timberlake); 1 male (paratype) from the same host on sugar-cane, Ewa Plantation, Oahu, August 3, 1918 (Timberlake); 1 female (paratype) collected in Honolulu, March 21, 1917 (Timberlake); 1 male (paratype) reared from *Aphis sacchari,* Hawaii Mill Co., Hilo, Hawaii, September 16, 1913 (Swezey); 1 female (paratype) collected at Waikea, Hawaii, October 2, 1913 (Swezey); 1 female (paratype) collected at Waialua, Oahu, January 8, 1923 (Swezey); 1 male (paratype) reared from *Aphis* sp. on *Scirpus maritimus* L., Honolulu, January 7, 1913

(Swezey) and 2 males (paratypes) collected in Honolulu in 1906 (Dr. Perkins).

Aphelinus maidis comes closest to A. *nigritus* and *lapisligni* Howard, and is distinguished by the characters given in the following table. In Kurdumoff's table of the European species it runs to *varipes* (Förster) and to *hordei* Kurdumoff, but does not agree with either, as both the middle and hind tibiae are black.

Aphelinus gossypii n. sp. Fig. 6.

Female. Head shaped exactly as in *maidis* as far as can be determined in more or less shriveled specimens; antennae (Fig. 6) inserted in the usual position; the scape not quite four times longer than wide, excluding the radicle joint; pedicel almost twice as long as the first two funicle joints combined; first funicle joint about twice as long as wide, the second distinctly longer than the first and about one-third wider than

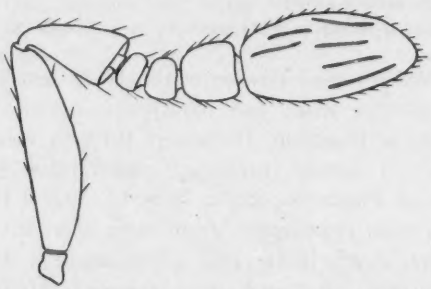

Fig. 6. *Aphelinus gossypii.* Antenna of female.

long, the third about as long as the first two combined, only slightly wider than long and a little less than one-third as long as the club; club rather broadly oval, one-half as wide as long, as long as the funicle and two-thirds of the pedicel combined, and provided with about six slender linear sensoria. Mandibles nearly as in *maidis;* maxillary palpi also the same, the labial pair with one joint about five times as long as thick; the terminal joint of both palpi in this species and also in *maidis* bears a slender, long, spine-like appendage, which may be a true but much attenuated segment, but which is regarded as a seta in the preceding computation of the joints. Thorax and abdomen practically as in *maidis;* wings fully developed, the speculum limited basad by a single row of coarser setae and by about two to five additional setae in the angle between this row and the marginal vein.

Sculpture about the same as in *maidis*, except that the setiferous punctures of the frontovertex are less numerous and less distinct; the pubescence the same, but sparser on the frons.

Color of the head and body shiny black, the base of the abdomen more or less distinctly yellow, the extreme tip of the abdomen and the ovipositor sheaths also yellowish. Mandibles pale brown; scape, and sometimes the pedicel, pale brown or dilutely fuscous, the rest of antenna dusky yellow. Legs, including coxae, blackish; apex of front femora, front tibiae except for a more or less distinct infuscation on the basal half, front tarsi, middle trochanters, apex of middle tibiae with spur and tarsi and hind tarsi except basal joint brownish yellow; hind trochanters and hind femora clear pale yellow. Wings almost hyaline, the veins yellowish.

Length of body (0.598 to) 0.914; length of head, 0.351; width of head, 0.443; thickness of head fronto-occipitally, 0.165; width of vertex at posterior ocelli, 0.174*; length of antenna, 0.434; width of mesoscutum, 0.396; length of fore-wing, 0.903; width of fore-wing, 0.405 mm.

Male. Very similar to the female, but smaller and with the antennae slenderer, the club being hardly wider than the funicle and more pointed at apex than in the female.

Length of body (0.452 to), 0.747; length of head, 0.295; width of head, 0.358; thickness of head fronto-occipitally, 0.160; width of vertex at posterior ocelli, 0.153; length of antenna, 0.403; width of mesoscutum, 0.302; length of fore-wing, 0.754; width of fore-wing, 0.349 mm.

Described from 25 females, 9 males (holotype and paratypes) reared from *Aphis gossypii* Glover collected in Honolulu in May, 1919, and in March, 1923; also 1 female (paratype) associated with this *Aphis* on Hibiscus in Honolulu, April 12, 1918 (Timberlake); 1 male (allotype), labelled "on bean *Aphis*," presumably *Aphis medicaginis* Koch, collected in Honolulu, November 22, 1904 (Swezey); and 1 male (paratype) collected at Kilauea, Hawaii, in July, 1906 (Dr. Perkins).

This species of *Aphelinus* is very similar to *A. mali* (Haldeman), but is readily distinguished by the characters given in the following table of species.

Aphelinus semiflavus Howard.

Three females reared February 29, 1916, from *Toxoptera aurantii* (Fonscolombe) collected on the Manoa Cliff trail on Tantalus, Oahu, and one female reared March 30, 1918, from

* Head somewhat shriveled, so that the measurements are necessarily more or less inaccurate.

Aulacorthum circumflexum (Buckton), also from Tantalus, agree very well with North American specimens from Clemson College, South Carolina and Los Angeles, California. The wings of these specimens are clearer hyaline than in the North American specimens, the scape and pedicel are paler and in the female from *A. circumflexum* the wings are small and narrow, but agree in this respect with all males that I have seen from the United States, and also with one female from Los Angeles. In both of these females with small wings the abdomen is considerably blackened except at the base.

TABLE OF CERTAIN SPECIES OF APHELINUS MOSTLY HAWAIIAN AND NORTH AMERICAN

The following table has been prepared to show the relationship of the two species described in the preceding pages, and to aid in the identification of these and other species. One Australian species is also included.

1. Body partly black or brown, or wholly dark..... 2
   Body wholly yellow except ocelli and eyes; wings with four basal rows of setae and a fifth row widely separated from the others; legs and antennae yellow.....*automatus* Girault

2. Speculum of fore-wing bounded basad by several rows of setae..... 5
   Speculum bounded basad by one and one-half rows of setae or by one row and several more or less scattered setae just beneath the marginal vein..... 3

3. Abdomen yellowish on basal segment; scape narrower..... 4
   Abdomen wholly black or fuscous; legs brownish, the hind femora pale yellow, hind tarsi whitish, with the basal joint brown; scape short and rather wide, about one-third as wide as long, hardly longer and a little wider than the club.....*niger* Girault

4. Frontovertex smooth and with very minute and inconspicuous punctures; scape blackish, about four times longer than wide, but hardly narrower than the club; pedicel about one-third longer than the third funicle joint; funicle and club clear yellow, the third funicle joint slightly longer than wide; hind tarsi not black at the base; ovipositor sheaths dusky except at apex..*mali* (Haldeman)
   Frontovertex with more evident pin-punctures beset with longer bristles than in *mali;* scape pale fuscous, about four times longer than wide, but considerably narrower than the club; pedicel nearly twice as long as the third funicle joint; funicle dusky, the club purer yellow, the third funicle joint slightly wider than long; hind tarsi yellowish with the basal joint and apex of the

last joint dark brown or blackish; ovipositor apparently shorter and more tenuous than in *mali*, the sheaths shorter and wholly yellow ..... *gossypii* n. sp.

5. Wings large and comparatively wide, the disk beyond the speculum finely and densely pubescent, the marginal fringe comparatively short and often inconspicuous 6

Wings comparatively small and narrow, the stigmal vein reaching far beyond the middle of the costal margin, the disk beyond the speculum with coarser, sparser setae, the marginal fringe, comparatively long and conspicuous; abdomen except the lateral margins usually wholly yellow; the male with elongate antenna, the third funicle joint not much shorter than the long, slender club ..... *semiflavus* Howard

6. Head wholly black 7

Face yellow, but the frontovertex brown or blackish.....
..... *abdominalis* (Dalman) and allies

7. Front and middle legs not wholly clear yellow 8

Legs wholly clear yellow, except the hind coxae and tibiae; abdomen not yellow at base; scape not over three times as long as wide; wings clear, hyaline..... *nigritus* Howard

8. Middle and hind coxae and tibiae brown or blackish, the hind femora clear yellow, remainder of legs yellowish although the front femora and tibiae may be more or less dusky; abdomen sometimes but not usually distinctly yellowish at the base in dry specimens; antennae much as in *nigritus* but the scape is about four times longer than wide; wings with a faint cloudiness on the disk mostly beyond the speculum ..... *maidis* n. sp.

Legs brown or blackish including the hind femora, but the tips of the tibiae, the tarsi, and all of the front tibiae more or less distinctly yellow; antennae about as in *maidis;* wings with a faint but distinct smoky cloud on the disk, deepest below the marginal vein ..... *lapisligni* Howard

Aphytis Howard.

In 1908, Dr. Howard suggested that it would be desirable to segregate the aphis-feeding species of *Aphelinus* into a new genus, but he never carried out his suggestion for the reason, I believe, that he was not entirely sure of the characters of the type species of the genus. Since that time Kurdumoff has given a synopsis of the European species of *Aphelinus,* and has shown clearly that the genotype, *A. abdominalis* (Dalman) is an aphis-feeding species. It is, nevertheless, still desirable to divide *Aphelinus,* but now it is apparent that coccid-feeding species

are the ones to be segregated. Two generic names are available for this group of species: *Prosaphelinus* De Gregorio, 1915, about which there is no doubt, and *Aphytis* Howard, 1900, which by the original description was said to differ from *Aphelinus* in having one less funicle joint. Mercet has already pointed out that *Aphytis chilensis* Howard in all probability is closely allied to his *Aphelinus longiclavae*, and therefore similar also to *A. capitis* Rust. I believe it is safe to conclude that *Aphytis chilensis* really has three funicle joints, with the first one very small and overlooked by Dr. Howard, and I therefore adopt this name for the group of the old genus *Aphelinus* containing the coccid-feeding species.*

The two genera *Aphelinus* and *Aphytis* as here recognized have much in common but most of the species differ considerably in habitus. *Aphelinus*, at least typically, has a broad head and the body tapering behind it to the apex of the abdomen, but the essential generic difference lies in the ovipositor. This in *Aphelinus* is comparatively tenuous and is enclosed entirely by the ventrites so that in oviposition it is protruded backward in a more or less horizontal position. In *Aphytis* the head, thorax and abdomen do not differ greatly in width, and the ovipositor is comparatively strong and entirely free, so that in oviposition it descends almost perpendicularly from near the base of the abdomen.

Two Hawaiian species belong to *Aphytis* as here recognized, viz: *Aphytis diaspidis* (Howard) and *A. limonus* (Rust).

Trichogrammatidae.

Megaphragma new genus.

Female. Head apparently very thin fronto-occipitally, the fronto-vertex somewhat wider than one-third of the whole head, the eyes large, the cheeks rather short, the sides of the head and the cheeks gibbously convergent on the mouth. Ocelli apparently absent. Antennae (Fig. 7a) inserted very high on the face between the eyes, apparently rather nearer

* Subsequent examination of the type of *Aphytis chilensis* in the National Museum does not lead me to change the above statement. Only two funicle joints are actually visible in the unique type, but the antennae are so folded beneath the head that an unobstructed view of the base of the funicle can not be obtained.

to the occipital margin than to the mouth, and six jointed; scape subfusiform-compressed, but not very wide, including the radicle about as long as the eyes; pedicel large and pyriform, contracted at apex, much thicker than the scape or the following two joints; funicle composed of one minute ring-joint which is twice as wide as long; club as long as the rest of the antenna, three-jointed, strongly fusiform in shape, the basal joint about twice as long as wide at the base but increasing in width toward the apex; middle joint about twice as long and thrice as wide as the preceding joint and widest just beyond the middle; apical joint very strongly conical, nearly as long as the preceding joint, and provided with conspicuous longitudinal chitinous ridges running the whole length and some of them strongly projecting at apex. Mandibles with two strong acute teeth at apex. Maxillary palpi apparently one-jointed but rather elongate and tapering; labial palpi not seen.

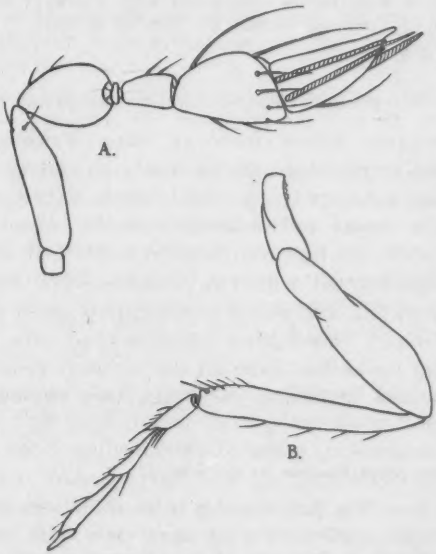

Fig. 7. *Megaphragma mymaripenne*. A. Antenna of female. B. Hind leg of female.

Thorax scarcely as long as wide; pronotum not visible from above; the parapsidal furrows strongly developed, the middle lobe of the mesoscutum about as long as wide; scutellum about twice as wide as long, and very broadly rounded at apex. Abdomen broadly sessile, very slightly narrower than the thorax and slightly longer, the apex rather

narrowly rounded; phragma of the mesothorax has but slightly converging sides and it reaches almost to the apex of the abdomen; ovipositor not protruded, and internally it reaches almost to the base of the abdomen; thorax and abdomen together form an oval mass nearly twice as long as wide.

Legs (Fig. 7b) of moderate length, the femora rather stout but compressed, the front tibiae also considerably enlarged; middle and hind tibiae and all the tarsi cylindrical and slender, the tarsi rather long although only three-jointed.

Wings resembling a typical Mymarid wing in shape, being linear, about seven times longer than wide, and having an exceedingly long marginal fringe; venation reaching about to the middle of the costal margin, the submarginal and marginal veins about equal in length, the stigmal vein short and stubby, the postmarginal vein absent; costal cell extremely narrow; disk of wing on the apical half with a row of few fine, short setae; hind wing extremely narrow, yet rounded at apex.

Male. Not known.

Type of the genus: *Megaphragma mymaripenne* n. sp.

Megaphragma differs from all other Trichogrammatidae known to me except *Hydrophylax* Matheson and Crosby in having the wings linear and very long-fringed. *Hydrophylax*, however, has the thorax and abdomen combined about four times as long as wide, the legs considerably longer and slenderer, the antennae eight-jointed with two well-developed funicle joints besides an annellus, and with a comparatively small three-jointed club. In Girault's classification *Megaphragma* falls in the tribe *Lathromerini* but differs from all the included genera with six-jointed antennae in having the wings very narrow and long-fringed.

Megaphragma mymaripenne n. sp. Fig. 7.

Antennae as in Fig. 7a, the middle joint of the club with two large setae and several smaller ones, the apical joint with one moderately long seta and with at least two of the chitinous sensoria projecting at apex.

Disk of wing with about five or six very minute setae in an irregular median longitudinal row on the apical half beyond the venation; disk narrowest opposite the apical part of the marginal vein, somewhat widening proximad and about twice as wide on apical half as at the narrowest point, the apex well rounded. Marginal vein with two fine, rather short setae at its base, and on the disk near the opposite margin just proximad of the constricted part is a somewhat longer seta. Marginal fringe

beginning on the posterior margin opposite the stigmal vein and consisting of about twenty-six setae, the first one opposite the stigmal vein being a little smaller than the discal seta just preceding it which is mentioned above; the following setae rapidly increasing in length, those at and on both sides of the apex about one-half as long as the wing itself, those on the anterior margin gradually and slightly decreasing in length basad and abruptly terminating at a point slightly more than midway between the apex of the wing and the stigmal vein; the remainder of the costal margin to the stigmal vein provided with a fringe of exceedingly minute short setae about five in number and visible only under high magnification.

Hind wing exceedingly narrow but triangularly widened at the hooklets, and slightly widened again at the apex which is rounded; no discal setae present; marginal fringe composed of twelve setae beginning on the posterior margin just beyond the hooklets and abruptly terminating on the anterior margin at the apex of the wing, only two of the setae being situated on the anterior side of the apex; the setae also rapidly increase in length towards the apex, where they are only slightly shorter than those of the fore-wing.

Tarsi of front legs distinctly longer than the front tibiae; tarsi of middle and hind legs (Fig. 7b) slightly shorter than the corresponding tibiae.

No definite surface sculpture observable under high magnification.

Head and thorax rather pale yellow, the eyes black; antennae and legs pale yellowish; occiput of head and the abdomen brown; wings hyaline, but the hind pair are rather distinctly infuscated at and near the hooklets.

Length of body, 0.252; length of antenna, 0.162; length of fore-wing, 0.229; greatest width of fore-wing, 0.031; greatest length of marginal fringe of fore-wing, 0.135; width of thorax, 0.118; length of thorax and abdomen combined, 0.195 mm.

Described from two females (holotype and paratype) mounted on a slide with fragments of about three other females which were accidentally crushed during preparation. These specimens were collected by Mr. C. E. Pemberton late in January, 1920, on the leaves of a forest tree at Mountain View, Hawaii, where they were associated with Thysanoptera. Mr. Pemberton had a suspicion at the time that the *Megaphragma* were parasitic on the thrips. This species is presumably an immigrant in the Hawaiian Islands, but of this there is, of course, no direct proof at present.

Aphelinoidea xenos n. sp. Fig. 8.

Female. Structurally similar to *A. semifuscipennis* Girault, but the basal joint of the club shows no transverse groove or suture on the ventral

side near the middle, the apical margin of the joint is more nearly straight on both sides, or only gently arcuate, whereas it is deeply angularly emarginate on the outer surface in *semifuscipennis;* the fore-wing narrower with fewer or about twenty discal hair lines at widest part of the disk, *semifuscipennis* having about twenty-five to twenty-eight lines, the disk, therefore, distinctly more sparsely pubescent; the marginal fringe distinctly longer and practically equal to one-fifth of the greatest width of the disk, but in *semifuscipennis* equal to about one-seventh of the width of the disk.

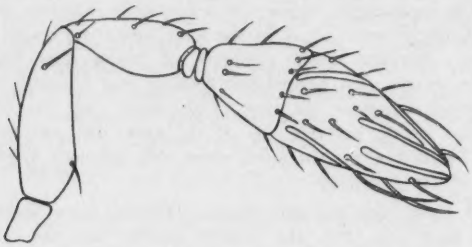

Fig. 8. *Aphelinoidea xenos.* Antenna of female.

General color much paler than in *semifuscipennis* or yellowish brown instead of piceous. Dry specimens are brown, with most of the head, the dorsum of the thorax and sometimes apex of the abdomen above paler and more or less yellowish, and with the lower half of the occiput, the cheeks, lower part of the face, the sternum, pleura, and most of the abdomen fuscous brown. In balsam mounts the coloration is dusky yellow, with the lower half of the occiput, the cheeks, oral margin of face, sternum, pleura, and transverse bands on the abdomen appearing rather dilutely fuscous, these darker parts being not very conspicuous nor sharply bounded except on the occiput, the bands on the abdomen sometimes confined to the basal half or two-thirds; rest of the face, apex, and part of the venter of abdomen purer brighter yellow, the frontovertex orange yellow; eyes and ocelli bright carmine; antennae clear yellow; legs dusky with the tips of the tibiae and the tarsi paler and more yellowish.

Wings hyaline, but with basal part beneath the venation clouded with fuscous, the apical margin of the cloud extending slightly obliquely distad from the apex of the stigmal vein towards the opposite margin and into the pubescent area of the disk; the cloud also with a darker triangular area beneath the apex of the marginal vein, the apex of the triangle touching the vein; just proximad is a slightly clearer area, somewhat similar in shape, but smaller and with the base of the triangle against the vein, sometimes this clearer area is more diffused and extends along the vein towards the base of the wing; hind-wings with a short slightly clouded

area beneath the apical half of the venation; marginal vein of both fore and hind-wings distinctly more infuscated than the rest of the venation.

The following measurements are given in a column parallel with similar measurements of *semifuscipennis:*

	xenos	*semifuscipennis*
Length of body to apex of ovipositor (0.471 to)	0.635 mm.	0.537 mm.
Length of antenna	0.234 mm.	0.224 mm.
Length of scape	0.081 mm.	0.079 mm.
Length of pedicel	0.049 mm.	0.045 mm.
Length of club	0.103 mm.	0.098 mm.
Length of basal club joint	0.037 mm.	0.035 mm.
Length of pedicel and flagellum	0.153 mm.	0.145 mm.
Length of fore-wing	0.475 mm.	0.499 mm.
Width of fore-wing	0.191 mm.	0.215 mm.
Length of marginal fringe of fore-wing	0.040 mm.	0.037 mm.

Male. Very similar to the female, but with the antennae slenderer, the two joints of the club practically equal in length, the wings narrower, with the discal pubescence somewhat sparser and the marginal fringe distinctly longer or nearly one-third as long as the greatest width of the disk.

Coloration as in the female, except that the fuscous bands on the abdomen are confined entirely to the basal half or a little more than half of abdomen, the fuscous cloud at base of wings somewhat paler.

Length of body, (0.417 to) 0.608; length of antenna, 0.222; length of scape, including radicle, 0.083; length of pedicel, 0.048; length of club, 0.081; length of basal joint of club, 0.041; length of pedicel and flagellum combined, 0.138; length of fore-wing, 0.478; greatest width of fore-wing, 0.163; length of marginal fringe of fore-wing, 0.051 mm.

Described from 21 females, 20 males (holotype, allotype, male and paratypes) mounted on slides and reared by Mr. Swezey from the eggs of *Sogata paludum* (Kirkaldy) collected at Kewalo in Honolulu on August 18, 1913, and on May 4, 1914; and 14 specimens (paratypes) of undetermined sex, mounted on cards and reared with the preceding specimens.

Records of the Introduced and Immigrant Chalcid-Flies of the Hawaiian Islands (Hymenoptera).

BY P. H. TIMBERLAKE.

(Presented at the meeting of December 6, 1923.)

The purpose of this paper is to provide a list of all known adventive Chalcid-flies found in the Hawaiian Islands, together with records of their distribution on the different Islands and dates of their introduction or first capture. Although host records are not a primary concern of this article, yet many of these records are given incidentally or for the purpose of designating more definitely certain undescribed species.

Records of 144 species are here brought together. Of these at least twenty-four species have been purposely introduced, in three instances subsequently to the first capture of the species, which at the time had not been recognized to occur in the Islands. A considerable number of other Chalcid-flies have been introduced at various times, but records only of those that have been recovered or found established are given here.

In point of time of the first capture or introduction twenty-six species have records extending back before 1902 and seven of these were collected by Blackburn during his residence in the Islands between 1876 and 1882.

During the twelve-year period between 1902 and 1913, inclusive, seventy-three species were first found or introduced so far as information is obtainable at this time; during the last ten years, 1914 to 1923, inclusive, forty-five additional species have been introduced or discovered for the first time. Although the record of first capture in the Islands of any particular species may be several to many years subsequent to its first establishment here, yet it is perhaps significant that a considerably smaller proportion of species were discovered during the last decade than during the preceding twelve-year period, the exact proportion being 4.5 species per year as compared with 6.08 species per year for the preceding period. Possibly the greater proportion for the 1902-1913 period is due to the fact that some of the species had been established for many years

and were finally brought to light because of the greatly increased activity along entomological lines that was inaugurated at about that time, but on the other hand the quarantine established in 1902 has doubtlessly prevented many species from gaining an entrance into the Islands and presumably has been increasingly efficient in this respect.

In the preparation of this paper I have received considerable help from Mr. A. B. Gahan, of the U. S. National Museum, who has generously compared specimens with types and supplied records of specimens in the National Museum. These records are designated by (U. S. Nat. Mus.) in the list.

AGAONIDAE.

1. ***Blastophaga psenes** (Linnaeus).

Introduced in 1909 from California and its distribution is limited to a few trees in the Moanalua Gardens near Honolulu.

2. ***Pleistodontes froggatti** Mayr.

Introduced in 1921 from Sydney and recovered in June of the same year. It is now well established in Honolulu and at Waimea, Hawaii.

3. ***Pleistodontes imperialis** Saunders.

Introduced in 1922 from Sydney and recovered in July of the same year. Its present distribution is limited to a few trees in and near Honolulu.

CALLIMOMIDAE.

4. **Podagrion beneficium** Girault.

One specimen is labelled (by inadvertence?) as taken in November, 1922, at Palolo, Oahu (Illingworth) but I have a suspicion that the record is erroneous and that the specimen is actually from Queensland.

5. **Megastigmus** sp.

One specimen was taken by Fullaway on a window in Honolulu, February 13, 1922, and the species is very likely not established.

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* Purposely introduced insects are starred throughout the list.

CHALCIDIDAE.

6. ***Brachymeria obscurata** (Walker).

Introduced by Koebele from Japan about 1895 and now common on Kauai, Oahu, Maui and Hawaii.

7. **Brachymeria polynesialis** (Cameron).

Taken by Blackburn in Honolulu and recorded by Ashmead also from Hilo, Hawaii. The species is now rarely found, and I have taken only two specimens, one in Honolulu and another at Honaunau, Kona, Hawaii. Mr. Swezey also found it at Hamakuapoko, Maui, in January, 1910.

8. **Stomatoceras pertorvum** Girault.

First taken in Honolulu by Dr. Perkins in 1900. It is now very common and widely distributed as it was collected at Puunene, Maui, in October, 1904 (Swezey), and at Lihue, Kauai, in September, 1907 (Swezey).

9. **Paranacryptus lacteipennis** (Cameron).

Taken by Blackburn on Oahu and now very rare. There is one female in the National Museum collected by Ashmead, July 6, 1901, at Hilo, Hawaii. It was described by Cameron in 1883 as *Epitranus lacteipennis*.

10. ***Dirhinus giffardii** Silvestri.

Introduced in 1913 from West Africa, and recovered at Waialae, Oahu, in September, 1921 (Fullaway).

EURYTOMIDAE.

11. **Eurytoma orchidiarum** (Westwood).

This species was found breeding on *Cattleya* orchids in Honolulu in June, 1914, by Dr. Lyon.

12. **Eurytoma** sp. parasitic on Braconidae.

Recorded by Dr. Perkins as first taken in 1903, but a series collected by him in December, 1903, at Bates Street, Honolulu, belongs to the following species. The earliest records verified by me are as follows: Reared from *Microbracon omiodivorus*

* Purposely introduced insects are starred throughout the list.

(Terry) at Naalehu, Hawaii, December, 1905 (Swezey); collected in Honolulu, April, 1907 (Swezey); reared from *Dinocampus coccinellae* (Shrank) at Puunene, Maui, June, 1909 (Terry), and collected at Waipouli, Kauai, March, 1917 (Swezey). It was recorded by Dr. Perkins also as a parasite of *Apanteles*.

13. **Eurytoma** sp. parasitic on Trypetidae.

Reared from *Tephritis crassipes* Thomson in December, 1903, at Bates Street, Honolulu (Perkins); collected at Huehue and in South Kona, Hawaii, in August, 1919 (Swezey), and at Olokele Canyon, Kauai, in September, 1920 (Swezey). It has been reared by Mr. Swezey on Oahu also from *Tephritis swezeyi* Bryan.

14. **Harmolita swezeyi** Phillips and Poos.

This species is phytophagus on Bermuda grass (*Cynodon dactylon* [*L.*] Pers.). The earliest records that I have been able to verify are as follows: Collected at Puako, Hawaii, May, 1905 (Swezey); at Honolulu in June, 1905 (Swezey); at Kealia, Kauai, May, 1906 (Terry) and at Iao Valley, Maui, August, 1908 (Swezey). Dr. Perkins thought that there might be two species of *Harmolita* in the Islands but I have been able to distinguish only one.

PTEROMALIDAE.

15. **Mormoniella brevicornis** Ashmead.

This species was reared by Terry from Muscoid puparia in Honolulu in December, 1907, and again in April, 1910. It was reared by him from *Chrysomyia dux* (Esch.), *Lucilia sericata* (Meig.), *Sacrophaga dux* Thomson and *Sarcophaga barbata* Thomson.

16. ***Muscidifurax raptor** Girault and Sanders.

Reared from *Sarcophaga* puparia collected at Waialae, Oahu, in May, 1907 (Swezey), and from the same host in Honolulu by Terry in August, 1907, and January, 1911. Reintroduced from South Africa in 1913 by Silvestri.

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* Purposely introduced insects are starred throughout the list.

17. **Zatropis tortricidis** Crawford.

Reared from *Gracilaria marginestrigata* Wlsm. in Honolulu, January and December, 1902 (Perkins); taken in the Alakai Swamp, Kauai, September, 1917 (C. N. Forbes); reared from lantana berries collected at Wailuku and Sprecklesville, Maui, May, 1921 (Swezey); collected at Honokaa, Hawaii (2500 feet), May 28, 1922 (F. X. Williams). It has been reared also from the lantana leaf-miner (*Cremastobombycia lantanella* Busck), and is commonly reared from lantana berries so that it is probably parasitic on *Agromyza lantanae* Froggatt.

18. **Aplastomorpha calandrae** (Howard).

Reared from corn infested with *Calendra oryzae* (Linn.), collected in Honolulu, January, 1910 (Swezey), taken in a corn-house at Hamakuapoko, Maui, January 29, 1910 (Swezey), and reared from *Calendra oryzae* in rat poison, Honokaa, Hawaii, October, 1922 (Pemberton). It was first recorded apparently by Bridwell in 1918 under the name of *Pteromalus calandrae* Howard (Proc. Haw. Ent. Soc., 3, p. 488) and as here determined includes the undetermined Pteromalid mentioned by him. It is now a common parasite in stored products and has been reared in Honolulu from *Mylabris quadrimaculatus* (Fab.), *M. chinensis* (Linn.) and *M. phaseoli* (Gyll.). It has been found by Bridwell also breeding in the open and was reared by him from *Mylabris pruininus* (Horn) and was also taken on Wailupe Ridge, Oahu, May 6, 1917 (Bridwell). In February, 1924, Mr. Ehrhorn found it in his office under conditions indicating that it was breeding on *Catorama mexicana* Chev.

19. **Lariophagus distinguendus** (Förster).

This species was collected at Pahala, Hawaii, May 21, 1915 (Swezey), and on a window in Honolulu, January 22, 1916 (Swezey). During 1916 about half a dozen specimens were taken on windows at the Sugar Planters' Experiment Station and one was taken by Mr. Ehrhorn at his home in Manoa Valley. It has been reared from *Calendra oryzae* (Linn.) infesting rat poison at Honokaa, Hawaii, October, 1922 (Pemberton).

20. **Lariophagus** sp.

An unidentified species of this genus was taken at Honolulu in a shipment of rice from Japan, September 17, 1909 (Lewis). A note attached to the specimens (four females) states that they were found flying around a larva of *Tenebroides mauritanicus* (Linn.). One male taken by Mr. Swezey at Paia, Maui, August 24, 1908, apparently belongs to the same species.

21. ***Lariophagus texanus** Crawford.

Introduced from Brownsville, Texas, in 1921, by Bridwell and Willard and reported by Willard later in the same year to have been recovered on Oahu. It is parasitic on *Mylabris sallaei* (Sharp) and doubtlessly on other species of *Mylabris*.

22. **Eupteromalus** sp.

This species was reared by Mr. Swezey from Dryinid cocoons, apparently one to each cocoon, probably of *Haplogonatopus vitiensis* Perkins and possibly also of *Echthrodelphax fairchildii* Perkins, on *Sogata paludum* (Kirkaldy), and also from cocoons of the spider Cryptine, *Arachnoleter swezeyi* Cushman, collected at Kewalo, Oahu, May 4, 1914; also reared by Mr. Swezey from *Gracilaria marginestrigata* Wlsm., mining *Xanthium* at Nawiliwili, Kauai, September, 1921.

23. **Bruchobius** sp.

One female was collected on a window of the Sugar Planters' Experiment Station, September 13, 1916 (Timberlake), and in April and May, 1923, it was reared in large numbers from pigeon peas infested with *Mylabris quadrimaculatus* (Fab.) and *M. chinensis* (Linn.), collected by Mr. Swezey. A small series was also brought back from India by Mr. Fullaway, these specimens having been reared from *Mylabris* larvae at Bangalore in February, 1921, by Subermanian. Mr. Gahan, to whom specimens were submitted, writes me that it is known to him also from the Philippines.

24. **Habrocytus** sp.

Reared from lantana leaf-miner *Cremastobombycia lantanella* (Busck) collected at Lihue, Kauai, May 6, 1921 (Swezey), and

* Purposely introduced insects are starred throughout the list.

from the same host collected at Specklesville, Maui, May 18, 1921 (Swezey).

25. **Pteromalid** undetermined.

A single female collected in Olokele Canyon, Kauai, by Mr. Swezey, September 5, 1920, shows considerable affinity with both *Bruchobius* and *Zatropis* but at present remains unplaced. It is a comparatively robust species, with a lenticular head, the vertex being strongly declivous behind the ocelli.

26. **Pteromalus fuscitarsis** Ashmead.

Described from a single specimen taken on Lanai by Dr. Perkins in January, 1894, and not recognized by me. As there are no other species of Pteromalidae present in the Islands that can be considered endemic, I believe this species must also be an immigrant.

27. ***Pachycrepoideus dubius** Ashmead.

Two females were reared from puparia of the cane-borer Tachinid (*Ceromasia sphenorphori* Vill.) collected in Honolulu, April 10, 1911 (Swezey) and one female was obtained from a puparium of a *Drosophila* sp. in rotting pineapple collected in Honolulu, October, 1907 (Terry). Reintroduced by Fullaway in 1914 from the Philippines.

28. **Pachyneuron allograptae** Ashmead.

Reared by Mr. Terry in April, 1904, from the puparia of *Simosyrphus grandicornis* (Macq.), collected on the plantation of the Oahu Sugar Company. More recently a series was reared from sorghum heads collected in Honolulu, July, 1920 (Timberlake), the host presumably being a Syrphid, as the material was infested with *Aphis maidis* Fitch.

Previously recorded as *P. syrphi* (Ashmead), 1881, but that name is preoccupied by *P. syrphi* (Ratzeburg), 1848, which is the same as *P. flavipes* (Förster) according to Kurdumoff. *P. allograptae* Ashmead, 1887, is the next oldest available name for this common North American species.

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* Purposely introduced insects are starred throughout the list.

29. **Pachyneuron siphonophorae** (Ashmead).

Reared from *Ephedrus incompletus* Provancher in an *Aulacorthum* sp. on rose-bushes, Honolulu, April and May, 1914 (Swezey), and from the same host at Wailuku, Maui, in June, 1916 (Swezey). Reared also from *Diaeretus chenopodiaphidis* (Ashmead) in *Myzus persicae* (Sulzer) on cabbage, Palolo Valley, Oahu, in August, 1917 (Timberlake).

30. **Pachyneuron** sp.

Three females were reared from puparia of *Leucopis nigricornis* Egger collected on sugar-cane in Honolulu in August and September, 1919 (Osborn and Timberlake). Recorded by me in 1920 as *P. anthomyiae* Howard in Proc. Haw. Ent. Soc., 4, p. 330, but it is very distinct from the common *Leucopis* parasite of the United States, which I believe is correctly identified as *anthomyiae*. The local species has practically no neck on the propodeum, and has the petiole of the abdomen smooth and polished and with a distinct prong on each side at about the middle. I have the same species also from California, where it was reared from several species of Coccidae.

MISCOGASTERIDAE.

31. **Tomocera californica** Howard.

This species was an early immigrant to the Islands and was collected by Blackburn. It was described by Cameron under the name of *Moranila testaceiceps,* and has been found on Oahu, Maui, Molokai, Lanai and Hawaii.

32. ***Tomocera ceroplastis** Perkins.

Found by Dr. Perkins on Tantalus, Oahu, and described as a parasite of *Ceroplastes rubens* Maskell in 1906. I have reared what is apparently this species from *Asterolecanium pustulans* (Cockerell) at Honolulu. The species seems to me rather doubtfully distinct from *californica*. According to Dr. Perkins it was introduced by Koebele from China.

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* Purposely introduced insects are starred throughout the list.

33. ***Scutellista cyanea** Motschulsky.

Introduced by Craw in 1905 from California and now a common parasite of *Saissetia nigra* (Nietner) and *S. hemisphaerica* (Targ.). Although there seem to be no specimens in collections except from Honolulu and vicinity I think it must be widely distributed in the Islands.

SPALANGIIDAE.

34. **Spalangia cameroni** Perkins.

Found by Blackburn and recorded by Cameron in 1881 as *S. hirta* Haliday. It has been taken on Kauai, Oahu, Maui, Molokai and Hawaii and parasitizes a variety of Diptera including *Stomoxys, Lyperosia, Sarcophaga, Limnophora* and *Dacus.*

35. ***Spalangia philippinensis** Fullaway.

Introduced by Fullaway in 1914 from the Philippines. It was reared in 1916 by Dr. Illingworth in Palolo Valley, Oahu, from various dipterous puparia in hen manure, and in September, 1919, by Willard from *Dacus cucurbitae* Coquillett in Honolulu.

36. **Spalangia** sp.

Reared by Mr. Swezey from horn-fly puparia (*Lyperosia irritans* Linn.) collected at Waialae, Oahu, March 15, 1910, and by Dr. Illingworth in 1916 together with the preceding species. This species may have been purposely introduced, as several other species of *Spalangia* are known to have been brought here, of which we have no exact record, or which have not been recovered.

The other two Hawaiian species of *Spalangia, S. lanaiensis* Ashmead and *S. simplex* Perkins seem to be endemic species.

37. **Choetospila elegans** Westwood.

First taken by Mr. Bridwell in Honolulu in 1913, and found by him at Haiku, Maui, in September, 1918; collected from a store window at Mountain View, Hawaii, October 19, 1917

* Purposely introduced insects are starred throughout the list.

(Timberlake). It has been reared from *Calendra oryzae* (Linn.) and from various Bruchids (Mylabridae).

38. **Spalangiid.**

This species belongs to what is apparently a new genus near *Cerocephala* Westwood. I have seen only five specimens, all taken in Honolulu, most of them probably at or near the Sugar Planters' Experiment Station. One was taken by Dr. Perkins in April, 1908, two by Mr. Swezey in 1915 and 1916, and two by myself in 1917 and 1921.

EUPELMIDAE.

39. **Anastatus koebelei** Ashmead.

This species was collected as early as 1892 at Kona, Hawaii, by Dr. Perkins, and described in 1901. In 1906, Perkins recorded it from Oahu as a parasite in the eggs of a Locustid, by which was meant the species now known as *Elimaea punctifera* (Walker). It is probably common on the other Islands, but I have seen no specimens except from Oahu, and one specimen from Iao Valley, Maui, taken by Mr. Bryan in 1919. The male of this species has not been found.

40. **Solindenia picticornis** Cameron.

Collected by Blackburn and now widely distributed throughout the Islands but not known elsewhere. It is certainly an immigrant through commerce, however, as it is remarkably different from the endemic Eupelmids. It is parasitic in the egg-capsules of a Blattid, *Allacta similis* (Saussure) and perhaps of others of the smaller Blattids, as indicated by Dr. Perkins in 1913 (Introduction, Fauna Haw. vol. 1, pt. 6, p. cvi). The male has been reared but is as yet undescribed.

41. **Charitopodinus swezeyi** (Crawford).

The first notice of this species was by Swezey in 1914, who recorded it as a *Eupelmus* sp. parasitic on *Harmolita* in Bermuda grass at Kaimuki. In 1918, Bridwell recorded it also as a parasite of Mylabridae, of *Chelonus blackburni* Cameron and of the Cryptine parasitic in the egg-cocoons of spiders, which has since been described by Cushman as *Arachnoleter swezeyi*. It was taken as early as June, 1905, on Oahu and in

1906 on Kauai. It has been taken by Mr. Muir also at Macao, China. The male remains unknown.

42. **Eupelmella subaptera** (Ashmead).

Described under *Eupelminus* by Ashmead in 1901 from the Waianae Mountains, Oahu. This species is rather rarely taken in the mountains of Oahu, and I presume that it is adventive because it is an isolated form.

43. **Eupelmus** sp.

One female taken by Mr. Swezey in the South Waianae Mountains, Oahu, on November 9, 1919, differs so remarkably from other Hawaiian *Eupelmus* that I believe that it is also adventive. The sculpture is remarkably smooth and polished and the scape is bright yellow.

ENCYRTIDAE.

44. **Xanthoencyrtus fullawayi** Timberlake.

This species was recorded by Fullaway in 1913 as the supposed male of *Pseudococcobius terryi,* but as no separate data were given its first appearance in the Islands is unknown. It was collected on Hawaii in 1916 by Mr. Swezey and in 1922 a large series was reared from *Trionymus calceolariae* (Maskell) collected on sugar-cane in Manoa Valley by Messrs. Swezey, Fullaway and Quan Chock. As many as fifteen parasites sometimes issue from a single mealy-bug. The male has not been found.

45. **Anagyrus nigricornis** Timberlake.

This species was taken on Oahu in March 1910 (Swezey), on Kauai, in 1915 (Swezey), on Maui in 1918 (Swezey), and on Hawaii in 1919 (Swezey, Giffard).

46. **Anagyrus antoninae** Timberlake.

First discovered in Honolulu in 1919 (Timberlake) and not yet found elsewhere in the Islands excepting one specimen taken by Mr. Swezey on Lanihuli, Oahu, in September, 1919. It is known also from Japan.

47. **Anagyrus swezeyi** Timberlake.

First recorded in 1913 by Fullaway and taken on Oahu as early as August 24, 1910, by Swezey; taken at Lihue, Kauai, May 23, 1918 (Timberlake), at Lupe Ditch, Maui, in June, 1918 (Giffard and Fullaway), at Napoopoo, Hawaii, August 10, 1919 (Timberlake), and on Sand Island, Midway, in April, 1923 (Fullaway). It is essentially a grass-inhabiting species and seems to be confined strictly to the lowlands.

48. ***Leptomastidea abnormis** (Girault).

Introduced from California in the winter of 1915-1916 by Ehrhorn and Fullaway. It is not known to have become established except at Honolulu and vicinity.

49. **Pauridia peregrina** Timberlake.

First recorded by Fullaway in 1913 but taken as early as 1906 by Dr. Perkins in Honolulu. It was taken on Maui in June, 1918 (Giffard and Fullaway), at Kilohana, Kauai, September 1, 1920 (Swezey), and on Eastern Island, Midway, in April, 1923 (Fullaway). It is also known from China, Luzon, Fiji, California and South Africa.

50. **Blepyrus insularis** (Cameron).

Taken on several of the Islands by Blackburn and known to me from Oahu, Maui and Hawaii.

51. **Encyrtus infelix** (Embleton).

Recorded by Ashmead in 1901 as *Encyrtus fuscus* from Hawaii and Lanai, and known to me also from Oahu and Maui. This species is widely distributed both in the lowlands and in the native forests.

52. **Encyrtus barbatus** Timberlake.

Recorded first in 1919 but taken as early as March, 1905, in Honolulu by Mr. Craw. Besides having been collected in a few localities on Oahu this species was taken by Mr. Swezey at Napoopoo, Hawaii, on August 10, 1919. It seems to be confined to the lowlands. It is known to me also from the fol-

* Purposely introduced insects are starred throughout the list.

lowing foreign localities besides those listed in 1919: Nagasaki, Japan (T. Ishii); Los Baños, Luzon (Woodworth) and San Marino, California (H. Compere).

53. **Homalotylus flaminius** (Dalman).

This species is represented by a single specimen collected by Koebele in Oahu and recorded by me in 1919.

54. **Quaylea whittieri** (Girault).

Taken as early as September, 1905, by Kotinsky in Honolulu; collected at Kona, Hawaii, by Pemberton in December, 1915, and at Kilauea, Hawaii, by Swezey in June, 1917. It was described by me in 1919 as *Q. aliena* and later merged with *whittieri*.

55. **Zeteticontus perkinsi** Timberlake.

Described elsewhere in this number from a specimen collected by Dr. Perkins in Honolulu in 1906; it has not been taken since.

56. **Microterys kotinskyi** (Fullaway).

First recorded in 1906 by Kotinsky as probably *M. flavus* (Howard) and again by Perkins in 1910 under the latter name. The species is now very common and widely distributed in the Islands and I have seen specimens from Kauai, Oahu, Maui and Hawaii.

57. **Microterys flavus** (Howard).

Of this species I have seen only three specimens, a pair collected on Hawaii by Koebele and one female taken by Mr. Bridwell on Kaumuohona, Oahu, on June 17, 1917.

58. **Aphycus alberti** Howard.

This parasite has been taken a few times in Honolulu and the first record goes back to October, 1914 (Swezey).

59. **Aphycus claviger** Timberlake.

Represented by only two specimens collected on Lanihuli, Oahu, September 3, 1916 (Timberlake). The female is similar to the preceding species but has a little wider scape, and the

abdomen is largely fuscous instead of wholly yellow as in *alberti*. The male is hardly distinguishable.

60. **Pseudococcobius terryi** (Fullaway).

As recorded by Fullaway in 1913 this species was first found by Terry on Maui in June, 1909. It is now known to be widely distributed on Hawaii, Maui, Oahu and Kauai. In July, 1919, I took an apterous female among *Eragrostis* in a very windy place on the side of Iao Valley, Maui. According to a recent letter received from Mercet the generic name *Aphycus* should be used for the group of species represented by *terryi*, but I will not make the change until he has published his conclusion.

61. **Aphycomorpha araucariae** Timberlake.

This parasite of *Eriococcus araucariae* Maskell has been taken only in or near Honolulu and the earliest record goes back to July, 1906 (Kotinsky).

62. ***Pseudaphycus utilis** Timberlake.

Introduced in 1922 from Orizaba, Mexico, and now well established and very effective on *Pseudococcus nipae* on Oahu. It has been distributed also to some of the other Islands.

63. **Xesmatia flavipes** Timberlake.

First recorded and described in 1920 from two specimens taken in widely separated localities in the mountains of Oahu in December, 1918, and June, 1919. More recently I have seen a specimen collected by Mr. Swezey at Kilauea, Hawaii, on August 5, 1919.

64. **Euchalcerinys apicicornis** Timberlake.

First collected by Mr. Swezey on March 28, 1915, and so far it has been taken only in the Koolau Mountains on Oahu. Like the preceding species it is a presumable immigrant.

65. **Aphidencyrtus schizoneurae** (Ashmead).

Recorded by Dr. Perkins in 1910 from Oahu and collected as early as June, 1905, in Honolulu (Swezey). Found at

* Purposely introduced insects are starred throughout the list.

Wailuku, Maui, June 18, 1916 (Swezey); at Mountain View, Hawaii, January 21, 1918 (Timberlake), and at Grove Farm, Kauai, in May, 1918 (Timberlake).

66. **Helegonatopus pseudophanes** Perkins.

Recorded in 1910 by Dr. Perkins from Oahu and collected by Terry at Waipahu in May, 1907; taken at Kekaha, Kauai, April 12, 1913 (Swezey); at Hakalau, Hawaii, March 6, 1915 (Swezey) and at Puunene, Maui, December 18, 1917 (Swezey).

67. **Saronotum americanum** Perkins.

Apparently first recorded by both Mr. Swezey and the writer in 1919, but taken as early as November 29, 1912, at Ewa Plantation, Oahu (Swezey); reared from Dryinid cocoons from Hilo, Hawaii, in September and October, 1913 (Swezey); taken at Olowalu, Maui, on December 20, 1917 (Swezey).

68. **Adelencyrtus odonaspidis** Fullaway.

First recorded by Dr. Perkins in 1913 from Honolulu as *Amicroterys* sp. and described by Fullaway in the same year, but taken as early as December 1, 1907, by Swezey at Wailuku; collected at Honaunau, Hawaii, August 13, 1917 (Swezey and Timberlake), and at Waikapu, Maui, March 23, 1924 (Swezey).

69. **Plagiomerus hospes** Timberlake.

So far this species has been collected only in the Koolau Mountains, Oahu, having been taken first by Mr. Giffard at Nuuanu Pali, October 19, 1919, and more recently by Mr. Swezey at Kalihi, Opaeula and Waimalu.

70. **Anabrolepis extranea** Timberlake.

This species has been taken up to the present time only in the Koolau Mountains of Oahu as follows: One female on Tantalus, October 26, 1919 (Giffard); another at the head of Manoa Valley, July 25, 1920 (Dr. Williams); a third on Waialae ridge (1500 feet), November 26, 1922 (Swezey); and another at Waikane on sandalwood, April 13, 1924 (Swezey).

71. **Anicetus annulatus** Timberlake.

First recorded in 1913 by Mr. Fullaway as *Cerapterocerus* sp. and taken by him in Honolulu, April 25, 1912; collected on

Puu Kapele, Kauai, February 14, 1915 (Swezey), and at Kaiwiki, Hawaii, September 22, 1918 (Swezey). The species is known to me also from Sacramento, California, and Chin San, Macao, China.

72. ***Comperiella bifasciata** Howard.

Recorded by Mr. Fullaway in 1913 as *Cerapterocerus* sp. and reared as early as August, 1905, by Kotinsky from *Aspidiotus* on *Bombax ceiba* Linn. in Honolulu. It was reintroduced in 1908 presumably from China and has been taken apparently only once in recent years, Mr. Fullaway having informed me that he collected a specimen in 1916. The species is common in Japan.

73. **Arrhenophagus albipes** Girault.

Incorrectly recorded by the writer in 1922 as *A. chionaspidis* from specimens taken near Honolulu in October, 1921, by Mr. Ehrhorn. It has since been found commonly in Honolulu and was taken at Kahuku, Oahu, November 8, 1923, by Mr. Pemberton. It was described in 1915 from Hongkong, China, and recorded by Girault also from Gifu and Jamsui, Japan.

APHELINIDAE.

74. **Aneristus ceroplastae** Howard.

This species was recorded by Fullaway in 1913 and by the writer in 1918 as *Prococcophagus orientalis* (Howard). Mr. Gahan of the U. S. National Museum more recently has compared the types of *ceroplastae* and *orientalis* and has pronounced them to be the same. The species was collected in Honolulu and at Waianae, Oahu, by Dr. Perkins in 1902; on October 10, 1905, it was collected at Hana, Maui (Swezey); in 1913 it was recorded from Kona, Hawaii, by Fullaway, evidently from specimens then recently taken; and on February 14, 1915, it was taken on Puu Kapele, Kauai (Swezey).

75. **Coccophagus** sp.

Recorded by Ashmead in 1901 as *Coccophagus lecanii*, but appearing to me to be distinct from that common North Ameri-

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* Purposely introduced insects are starred throughout the list.

can species. I have examined specimens collected by Dr. Perkins in Honolulu, and two specimens collected on Hawaii by Koebele (his Nos. 1117 and 1560). Although formerly common, the species has become extremely reduced in numbers in recent years, probably because of competition with the preceding species, and the only recent specimen that I have seen is a male, that apparently belongs here, reared by Mr. Swezey from *Eucalymnatus tessellatus* (Sign.), collected on Puu Kapele, Kauai, February 14, 1915.

A *Coccophagus* sp. was recorded in 1893 by Mr. W. G. Wait in the Planters' Monthly, vol. 12, p. 562, from North Kona, Hawaii, as parasitic on *Pulvinaria* and *Lecanium* on coffee. It was called by the manuscript name, *Coccophagus hawaiiensis* Howard, and its identity with the species incorrectly called *lecanii* by Ashmead has been established recently by examination of specimens (two females, with the date, October 24, 1893) in the National Museum.

76. **Coccophagus ochraceus** Howard.

An insect was recorded by Ashmead in 1901 from Kilauea, Hawaii, under this name, but the identification, like several others of Ashmead's, is open to grave doubt. *Ochraceus* has recently become well known to me from California and South Africa, and I have seen nothing similar to it from the Hawaiian Islands.

77. **Centrodora xiphidii** (Perkins).

Described by Dr. Perkins in 1906, but recorded by Swezey in 1905 from Honolulu and Makiki, Oahu; Lahaina, Maui and Koloa, Kauai. It was collected also at Hilo, Hawaii, on October 2, 1913 (Swezey). I have seen no specimens collected earlier than 1905.

78. **Prospaltella koebelei** Howard.

Described by Dr. Howard in 1908 from "Hawaii," his specimens having been reared by Koebele from *Morganella longispina* (Morgan). I have not seen this species.

79. **Prospaltella** sp.

A small black species with a pale yellow scutellum has been

collected on Oahu several times, and is presumably the species recorded by Fullaway in 1913 as *Coccophagus lecanii* from *Aspidiotus rapax* Comst. One female was taken by Dr. Perkins in Honolulu in December, 1908, and I have taken two specimens on Tantalus and Mt. Kaala. In March, 1924, it was reared by Mr. Swezey from *Aspidiotus cydoniae* Comst. on sugar-cane collected at the Experiment Station grounds in Honolulu. In the National Museum I found one female reared by Koebele from an *Aspidiotus* sp. on ohia tree at Olaa, Hawaii (No. 1561), and unfortunately without any date.

80. **Prospaltella** sp.

A wholly orange-yellow species with yellow antennae and legs and hyaline wings, which have a moderately long marginal fringe, was collected by Mr. Swezey from grass on Pearl Harbor Peninsula, Oahu, July 4, 1919.

81. **Encarsia versicolor** Girault.

In 1907, Kotinsky recorded an *Encarsia* sp., which was reared from *Aleyrodes sonchi* Kotinsky, presumably in Honolulu. This record very likely was inclusive of both this and the following species, as both had been reared at that time by Mr. Swezey from this host. Of *versicolor* I have seen a number of specimens reared from *Aleyrodes sonchi* and *Aleyrodes vaporariorum* Westwood, in Honolulu, the oldest specimens having been taken by Mr. Swezey in the Kalihi district on January 27, 1906. In the National Museum I also found specimens reared by Koebele from *Aleyrodes* on lantana as early as February, 1899, at Kona, Hawaii. I have a large series of this species reared in California from several species of Aleyrodidae, and a few specimens from New Haven, Connecticut, out of *Aleyrodes vaporariorum* collected by Mr. B. H. Walden. The species was described from the latter host from Urbana, Illinois.

82. **Encarsia** sp.

This is a bright yellow species with the wings wholly hyaline, the disk of the wing rather broad, without a bare area beyond the stigmal vein, and with the marginal fringe less than one-half of the width of the disk. I have examined specimens of this species reared from *Aleyrodes sonchi, A. vaporariorum* and

A. hibisci Kotinsky. It was taken in Honolulu, May 27, 1907 (Swezey), in Kona, Hawaii, in December, 1915 (Pemberton), and in Hilo, January, 1918 (Timberlake). In the National Museum there are some much older specimens reared by Koebele from an *Aleyrodes* on coffee at Olaa, Hawaii, in December, 1898.

83. **Aspidiotiphagus citrinus** (Craw).

Recorded by Dr. Howard in 1898 from Honolulu, but the record probably pertains to the following species, at least in part. Reared by G. Compere in Honolulu as early as January, 1899, from *Chrysomphalus rossi* (Mask.) on *Araucaria* (U. S. Nat. Mus.); taken in Kona, Hawaii (5000 feet), by Koebele, host and date not given, Koebele's Nos. 1526, 1527 (U. S. Nat. Mus.); reared from *Aspidiotus perniciosus* Comst. and *A. hederae* (Vall.) from Makaweli, Kauai, date not given, Koebele's Nos. 1135, 1136, and 1137 (U. S. Nat. Mus.). *Citrinus* at the present time seems to be considerably less abundant in Honolulu than the following species.

84. **Aspidiotiphagus agilior** Berlese.

According to a paper by Mr. A. B. Gahan, of which I have seen a manuscript copy, this species is apparently distinct from *citrinus*. *Agilior* has not been recorded from these Islands heretofore—at least under its present name—although Dr. Howard's record of *citrinus*, in 1898, was presumably at least inclusive of this species. It was reared by Koebele in Honolulu in August and October, 1896, from *Parlatoria zizyphi* (Lucas) and *Fiorinia fioriniae* (Targ.) (U. S. Nat. Mus.); from *Lepidosaphes beckii* (Newm.) on orange in Kona, Hawaii, in April, 1898, and at Makaweli, Kauai, in May, 1898 (U. S. Nat. Mus.).

A species of *Aspidiotiphagus* was introduced by Koebele about 1894 from China and Japan, but whether it was this or the preceding species, or both, is unknown.

85. **Aphelinus maidis** Timberlake.

Probably both this and the following species were included by Fullaway in 1913 in his record of *Aphelinus mali*, as both were present in collections at that time. *Maidis* was collected in Honolulu in 1906 by Dr. Perkins, and a mummified cane aphis (*Aphis sacchari* Zehntner) is preserved in the collection

of the Sugar Planters' Station, collected at Lahaina, Maui, September 27, 1905 (Swezey), which was without doubt parasitized by this species, this aphid being commonly attacked by it; it was reared from the cane aphis at Hilo, Hawaii, September 16, 1913 (Swezey); and on May 22, 1918, the writer found the corn aphis (*Aphis maidis* Fitch) parasitized by this species at Grove Farm, Kauai.

86. **Aphelinus gossypii** Timberlake.

The oldest specimen of this species that I have seen was taken in Honolulu on November 22, 1904, by Mr. Swezey, and the species was taken also at Kilauea, Hawaii, by Mr. Perkins in July, 1906.

87. **Aphelinus semiflavus** Howard.

Of this species, I have reared three specimens from material collected on Tantalus, Oahu. From *Toxoptera aurantii* (Fonscolombe), I obtained two females on February 29, 1916, and one female on March 30, 1908, from *Aulacorthum circumflexum* (Buckton).

88. **Aphytis diaspidis** (Howard).

Recorded by Kotinsky in 1905 as *Aphelinus fuscipennis* from Mokuleia, Oahu, and in 1913 by Fullaway as *Aphelinus diaspidis*, but taken in Honolulu by Koebele as early as January, 1899 (U. S. Nat. Mus.). I have seen specimens only from Honolulu.

89. **Aphytis limonus** (Rust).

The *Aphelinus* species incidentally recorded by Girault in 1913 from Honolulu proves to be this species, together with a few specimens of *diaspidis*. These specimens were reared by Koebele, March 10, 1899, from an *Aspidiotus* on oleander in Honolulu (U. S. Nat. Mus.). This species was also reared in Honolulu by Mr. George Compere in January, 1899, from three different species of diaspine scales. *Limonus* was described by Rust in 1915 from specimens collected by Mr. Ehrhorn in 1911. It is a common species in Honolulu, but I have not seen it from any other locality.

90. **Marietta** sp.

First recorded by Fullaway in 1913 from Honolulu, but collected considerably before that time by Dr. Perkins. The earliest specimens that I have seen were taken by Mr. Swezey at Kaimuki, on March 8, 1913; others were taken at Kahuku, Oahu, July 18, 1919, and at Waikapu, Maui, on March 23, 1924, also by Mr. Swezey. It is now a common species on Oahu and occurs in a fully winged and apterous condition. In habits it is a secondary parasite of *Trionymus* and *Antonina* on grasses.

91. ***Marietta carnesi** (Howard).

In 1907, Mr. Kotinsky reported on the introduction of a *Perissopterus* sp. from China, which was reared from *Lepidosaphes* and liberated in Honolulu in the summer of 1906. In 1913, Mr. Fullaway recorded a *Perissopterus* which he had reared from a *Lepidosaphes* sp. at the Federal Experiment Station. The identity of the species concerned in these records is not certain, as I have seen no specimens, but there are grounds for believing that it was *carnesi* Howard. At any rate, I captured a female of this species on February 10, 1924, in Makiki, Oahu, on *Schinus* infested with *Saissetia nigra* (Nietn.), and later reared a few more specimens from material collected at the time. *Carnesi* has been known previously as a secondary parasite of Diaspine scales. It is readily distinguished from the preceding species by the very slender scape, which is no wider than the pedicel.

92. **Eretmocerus corni** Haldeman.

This species was determined by Dr. Perkins for Kotinsky, who recorded it from Honolulu in 1907 as a parasite of *Aleyrodes hibisci* Kotinsky. I have reared this species from the same host collected at Hilo, Hawaii, in January, 1918.

93. **Archenomus perkinsi** (Fullaway).

Described by Fullaway in 1913 from Honolulu, under the genus *Pteroptrichoides* from specimens collected by Kotinsky on August 24, 1906. It apparently has never been found elsewhere in the Islands.

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* Purposely introduced insects are starred throughout the list.

94. **Pseudopteroptrix imitatrix** Fullaway.

First recorded by Fullaway in 1913 as *Pteroptrichoides* sp. as a parasite of *Howardia biclavis* (Comst.) and still known only from Honolulu.

SIGNIPHORIDAE.

95. **Signiphora aspidioti** Ashmead.

This species was recorded from Honolulu in 1913 by Mr. Girault as *S. coquilletti* and was reared from several species of *Aspidiotus* in Honolulu by Koebele as early as January and March, 1899 (U. S. Nat. Mus.). There are also specimens in the National Museum reared by Koebele from *Aspidiotus* sp. on ohia at Olaa, Hawaii.

96. **Signiphora** sp.

This is apparently the species recorded by Fullaway and by Muir in 1913 as *Thysanus* sp. from *Aspidiotus* species in Honolulu. It was reared from a *Parlatoria* on avocado at Kaimuki, June 3, 1913 (Swezey), and also reared by me apparently from *Coccus longulus* (Dougl.), although some diaspine scale may have been included in the material. It is distinguished from the following species by having a well-developed discal bristle on the fore-wing and by having the antennal club proportionately shorter and wider.

97. **Signiphora thoreauini** Girault.

One female was collected by Mr. Swezey on May 19, 1917, at Niulii, Hawaii. This specimen has the antennal club considerably longer and narrower than in Californian specimens of this species, but in almost all other respects it agrees very closely.

TETRACAMPIDAE.

98. **Astichus cyaneus** Ashmead.

This species apparently requires a new generic name, as it certainly is not a true *Astichus* and belongs to a different group from that assigned to it by Ashmead. It was described in 1901 from a specimen taken on Lanai in January, 1894. It was taken on Oahu by Perkins, and much earlier by Blackburn; found also on Maui in 1918, and on Kauai in 1921 by Swezey. It is a

rather rare species occurring in the native forests, and I believe it must be adventive because of its isolated position in respect to the native fauna.

Eulophidae, Entedoninae.

99. **Secodella metallica** (Ashmead).

Described as *Omphale metallicus* in 1901 from specimens taken on Hawaii, Molokai, Oahu, and Kauai. It was taken on Mt. Kaala, Oahu, by Dr. Perkins as early as December, 1892 (U. S. Nat. Mus.). It has been taken also on Maui. Like the preceding species, it has usually been considered endemic, but I believe it has all the earmarks of an immigrant species, it being an isolated species without congeners in the Islands, and occurring at all elevations on many different hosts.

100. **Achrysocharis fullawayi** (Crawford).

Described in 1913 from Honolulu as *Derostenus fullowayi* (sic) and apparently first taken by Fullaway about 1910. It has been reared from *Agromyza pusilla* Meig. collected at Paauhau, Hawaii, January 17, 1918 (Timberlake), and from *Cremastobombycia lantanella* Busck collected at Lihue, Kauai and Ulupalakua and Sprecklesville, Maui, in May, 1921 (Swezey). It has been reared also from *Gracilaria marginestrigata* Wlsm., *Gracilaria hibiscella* Swezey and *Philodoria pipturiella* Swezey.

101. **Achrysocharis** sp.

This species, which has not been previously distinguished from *fullawayi,* was reared by Dr. Perkins as early as January, 1902, in Honolulu, from *Gracilaria marginestrigata* Wlsm. Two females were reared from the same host at Kaimuki, March 8, 1908 (Swezey), and two females were taken at Kekaha, Kauai, in August, 1913 (Osborn). It seems to have become very largely if not wholly replaced by the preceding species, as all the specimens of *Achrysocharis* obtained in recent years belong to *fullawayi.* It is distinguished from *fullawayi* by the considerably coarser reticulation and by the brighter, more brassy green color with purple on the scutellum.

102. **Chrysocharis parksi** Crawford.

Recorded by Crawford in 1913 as *Chrysocharis* sp. from

specimens collected in Honolulu by Fullaway. It was reared from *Agromyza pusilla* Meig. at Kaimuki, June 24-27, 1906 (Swezey), and collected at Pahala, Hawaii, as early as May 6, 1905 (Swezey). In September, 1918, Mr. Bridwell reared it from *Agromyza pusilla* at Haiku, Maui.

103. **Pleurotropis** sp.

This species was reared from the cocoons of *Microbracon omiodivorus* (Terry) in April, 1917, at Honolulu (Bridwell and Timberlake), and has not been recorded heretofore from the Islands.

104. **Entedonine** sp.

This species, which is parasitic in the cocoons of the spider Cryptine, *Arachnoleter swezeyi* Cushman, was taken by Mr. Terry at Waipahu, Oahu, in May, 1907, and at Honolulu in June of the same year. It is now widely distributed on Oahu, but apparently has not been found on the other Islands. It is recorded here for the first time.

105. ***Horismenus** sp.

Introduced by Bridwell and Willard from Brownsville, Texas, in 1921, and recovered by Mr. Willard on Oahu, in 1923.

TETRASTICHINAE.

106. **Melittobia hawaiiensis** Perkins.

Described in 1907 from Honolulu, and the earliest specimen that I have seen was taken by Dr. Perkins on a window at Waikiki, Oahu, in 1903 or 1904.† Mr. Swezey has discovered its work in *Sceliphron* cocoons, also at Kilauea, Kauai, and in July, 1920, obtained specimens from *Odynerus nigripennis* Holm. collected at Keanae, Maui. Taken also in *Sceliphron* nest at Kealakekua, Hawaii (3500 feet), August 20, 1919 (Swezey and Timberlake).

107. **Melittobia peles** Perkins.

Described as a variety of the preceding species by Dr. Per-

* Purposely introduced insects are starred throughout the list.

† The label is obscure, with the final figure rewritten so that it is not evident whether 1903 or 1904 was intended.

kins, who says that it is probably a distinct species. With this I fully agree, as there are good structural characters to separate it in both sexes. Dr. Perkins' unique specimen was collected at Kilauea, Hawaii, in July, 1906. Two females were collected on Mt. Olympus, Oahu, by Swezey, on April 2, 1911, and in July, 1918, I obtained a large series, including males from a larva of *Odynerus nigripennis* collected at Nuuanu Pali, Oahu.

108. **Tetrastichine** near **Melittobia.**

This is the parasite of *Ereunetis flavistriata* Wlsm. recorded by Mr. Swezey in 1909 from Honolulu (Exp. Sta. H. S. P. A., Ent. Bull., 6, p. 29). It resembles *Melittobia* in many ways, but is smaller, more metallic, and the funicle has only two joints. The male, moreover, closely resembles the female. Reared by Mr. Swezey from an *Ereunetis* larva on coconut at Grove Farm, Kauai, September 13, 1907, and taken by him in Honolulu, January 20, 1908. It seems to be a common parasite of *Ereunetis* in Honolulu, and probably is more widely distributed than the records show.

109. ***Ootetrastichus beatus** Perkins.

Introduced from Fiji in 1905 and now well distributed throughout the sugar-cane districts of the Islands.

110. ***Ootetrastichus formosanus** Timberlake.

Introduced from Formosa in 1916 and now distributed to the same extent as *O. beatus.*

111. **Tetrastichus hagenowii** (Ratzeburg).

Recorded by Ashmead in 1901 from Hawaii and Lanai, and probably one of the earliest immigrants of this group of insects, but not taken by Blackburn so far as I am aware. It presumably occurs on all the larger Islands, although I have seen specimens only from Kauai, Oahu, Maui, and Hawaii.

112. ***Tetrastichus giffardianus** Silvestri.

Introduced by Fullaway from West Africa in 1914. The following records of specimens taken in general collecting will be of interest: Collected on Konahuanui, Kaumuohona, and at Pauoa

* Purposely introduced insects are starred throughout the list.

Flats, Oahu, in June, 1917 (Bridwell), taken in Iao Valley, Maui, on September 5, 1919 (Bryan).

113. **Tetrastichus** sp.

Collected at Makiki, Oahu, January 25, 1907 (Swezey), and now rather common in Honolulu. Most of my specimens were taken on store windows, although the species also occurs in the open. It is distinguished from other Hawaiian species by the median scutal groove, the dark femora and yellow scape and pedicel.

114. **Tetrastichus** sp.

Of this species I have seen only one specimen, collected by me from a store window at Kaimuki, Oahu, on January 5, 1918. It is somewhat similar to *hagenowii*, but is much more depressed, more metallic, and with a smoother sculpture. It seems to be closely allied to *T. metallifer* Masi.

115. **Tetrastichus** sp.

Taken by Dr. Perkins at Kilauea, Hawaii, in June, 1906, and there is a note attached to the specimen to the effect that it was apparently associated with *Eurytoma* or a Pteromalid parasitic on Diptera, and that the species is widely distributed, as he had taken it on Tantalus, Oahu. Mr. Giffard has also reared this species at Kilauea from *Tephritis* puparia in *Raillardia* flowerheads, April, 22, 1920. Among Hawaiian species it is most similar to the third species recorded above (No. 113), but it has the propodeum much shorter, the oral margin yellow, the scape and pedicel dark, and the femora yellow at base and apex.

ELACHERTINAE.

116. **Elachertus advena** Timberlake.

This species will be described elsewhere in the near future. First recorded by me in 1919 as *Elachertus* sp. from specimens reared by Professor Crawford in Honolulu from *Hypothenemus*, but taken as early as June 10, 1917, on Tantalus by Mr. Bridwell. Taken at Waikee, Maui, September 4, 1919 (Bryan), and a good series, including males, was taken by Mr. Fullaway on Sand and Eastern Islands, Midway, in April, 1923.

117. **Elachertus** sp.

A small series of this species, which has not been recorded heretofore, was reared by Mr. Giffard on July 9, 1906, from an unknown host collected in Moanalua Valley, Oahu.

118. **Elachertine.**

Recorded by me in 1919 as a *Rhopalotus* sp., but now placed in a different group. One female was swept from grass and weeds near Lihue, Kauai, May 23, 1918 (Timberlake); four females were collected by Mr. Swezey at Honaunau, Hawaii, August 13, 1919; and one female was taken by Mr. Fullaway in Honolulu on December 4, 1920.

119. **Cirrospilus** sp.

Reared from *Cremastobombycia lantanella* Busck at Lihue, Kauai, May 6, 1921, and from the same host at Spreckelsville, Maui, May 18, 1921 (Swezey); reared from *Gracilaria marginestrigata* Wlsm. at Kaimuki, Oahu, in April, 1922 (Timberlake).

EULOPHINAE.

120. **Diaulinus** sp.

Recorded by Crawford in 1913 from Honolulu, but reared as early as November 30, 1906, by Mr. Swezey at Kaimuki, Oahu, from *Gracilaria marginestrigata* Wlsm.; reared by Mr. Bridwell in September, 1918, from *Agromyza pusilla* Meig. at Haiku, Maui.

121. **Notanisomorphomyia** sp.

This is the species recorded by me in 1922 as *Eulophus* sp. One female was taken in Honolulu, May 28, 1917, probably by Mr. Swezey; it was reared from *Cremastobombycia lantanella* Busck, collected by Mr. Swezey at Lihue, Kauai, May 6, 1921, at Ulupalakua, Maui, on May 17, 1921, and at Huehue, Hawaii, on July 27, 1921. This species has been reared also from *Gracilaria marginestrigata* Wlsm., *Gracilaria neraudicola* Sw., *Euhyposmocoma trivitella* Sw., *Bedellia orchilella* Wlsm., etc. Although it has been reared and collected in considerable numbers, no males have yet been found.

122. **Pseudopheliminus** sp.

This species was first taken by Mr. Swezey, who collected a male on Waialae Ridge, Oahu, November 26, 1922; it was reared from *Gracilaria hawicola* Swezey collected at Hanalei, Kauai, on March 16, 1923 (Swezey); one female was taken on Nihoa by Mr. Bryan on June 14, 1923, and one at Wailuku, Maui, by Mr. Swezey on December 9, 1922. I have reared it also from *Gracilaria marginestrigata* collected at Pearl Harbor Peninsula, Oahu, in March, 1923, and at Kaimuki in January and February, 1924.

TRICHOGRAMMATIDAE.

123. **Brachistella lutea** (Fullaway).

Described by Fullaway in 1914 as *Jassidophthora lutea* from specimens reared from the eggs of *Draeculacephala mollipes* (Say) at Honolulu apparently early in 1913, as Mr. Muir exhibited specimens at the meeting of the Entomological Society on February 6, 1913; it was reared also from the eggs of *Conocephalus saltator* (Saussure) collected in Honolulu by Mr. Swezey in January, 1913, and taken at Ewa, Oahu, by Mr. Swezey on August 13, 1921.

124. **Oligosita hilaris** (Perkins).

Described by Dr. Perkins in 1910 as *Westwoodella hilaris* and taken by him in Honolulu as early as January, 1904. I have seen only a few specimens including the type, all of which were collected by Dr. Perkins.

125. **Oligosita caerulocephala** (Fullaway).

Described by Fullaway in 1914 as *Westwoodella caerulocephala* from specimens taken at the same time and under the same circumstances as the types of *Brachistella lutea*, but it was reared by Mr. Swezey also in 1912 from Cicadellid eggs in sedge at Honolulu.

126. **Ittys** sp.

Reared by me from the eggs of *Nesophrosyne maritima* Kirkaldy in *Dodonaea* leaves collected at Makua, Oahu, July 16, 1916.

127. **Aphelinoidea xenos** Timberlake.

Reared by Mr. Swezey from the eggs of *Sogata paludum* (Kirkaldy) collected at Kewalo in Honolulu on August 18, 1913, and May, 4, 1914.

128. ***Uscana semifumipennis** Girault.

Introduced in 1910 from Texas and first reported to be established at Honolulu by Fullaway at the meeting of the Entomological Society held February 1, 1921; found at Kona, Hawaii, in July, 1912, by Fullaway. It has not been reported from the other Islands, but doubtlessly occurs also on Maui and Kauai.

129. **Ufens** sp.

This parasite of the eggs of *Elimaea punctifera* (Walker) and *Holochlora japonica* Brunner was first recorded by Dr. Perkins in 1910. All the specimens that I have seen were taken in or near Honolulu except one or two specimens taken by Mr. Swezey at Barber's Point, Oahu, on December 23, 1923.

130. **Trichogramma semifumatum** (Perkins).

Described by Dr. Perkins in 1910 as *Pentarthron semifumatum* from Honolulu and Kilauea, Hawaii, but collected as early as June, 1906, at the latter locality; reared from undetermined Noctuid eggs on lichens on a dead tree, Haleakala, Maui (6000 feet), in July, 1919 (Timberlake). Not known from Kauai, but presumably occurring there.

131. **Trichogramma minutum** Riley.

Described by Dr. Perkins in 1910 as *Pentarthron flavum* from Honolulu and renamed *T. perkinsi* by Girault. Recorded as *T. pretiosa* in 1907 by Mr. Swezey, who reared specimens from the eggs of *Omiodes meyricki* Swezey collected at Honomu, Hawaii, on March 21, 1907, and who also took specimens in Honolulu a few days later. Some poor specimens with unexpanded wings reared by Mr. Swezey from the eggs of *Anomalochrysa* at Kilauea, Hawaii, on September 28, 1913, apparently belong to this species. It is commonly found also in the eggs of *Amorbia, Lycaena, Herse, Vanessa,* etc. The earliest specimens

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* Purposely introduced insects are starred throughout the list.

seen were reared by Koebele in Honolulu in the summer of 1900 from the eggs of *Omiodes blackburni* (Butler) (U. S. Nat. Mus.).

132. **Megaphragma mymaripenne** Timberlake.

A few specimens of this remarkably minute species were taken by Mr. Pemberton, who found them associated with a thrips in the forest at Mountain View, Hawaii, late in January, 1920.

MYMARIDAE.

133. **Alaptus immaturus** Perkins.

Recorded by Dr. Perkins in 1910 from Oahu and reared as early as January 6, 1905, by Mr. Terry at Oahu Sugar Company. There seems to be no doubt that it was unintentionally introduced from Queensland at the time that the leafhopper egg parasites were being established. It was taken at Hilo, Hawaii, on March 8, 1913, by Mr. Swezey.

134. **Alaptus globosicornis** Girault.

Recorded by Girault from Honolulu on a single specimen taken August 3, 1900, and the variety *hawaiiensis* was based by him on this specimen. Specimens that I have seen reared from the eggs of the common wingless Psocid that infests insect collections (*Atropos divinatoria*) are uniformly greyish, with the abdomen paler. In life they are decidedly blackish in color, with the abdomen much more dilutely pigmented and appearing translucent dusky whitish, especially in the male. This coloration agrees reasonably well with the original description of *globosicornis*. The *Alaptus* recorded by Mr. Swezey from Psocid eggs in the nests of *Megachile* from Koko Head, Oahu, I believe must be this species, as I have reared specimens under the same conditions. The male has the second funicle joint distinctly smaller than the joint on either side. One male was taken by Mr. Osborn at Hakalau Plantation, Hawaii, in May, 1914.

135. **Alaptus** sp.

One female taken by Mr. Osborn at Hakalau Plantation with the male of *globosicornis* recorded above and two males taken by Mr. Swezey on a window in Honolulu, November 28, 1915, belong to a species heretofore unrecorded from the Islands.

The female differs from *immaturus* in its more dusky color and much shorter antennae and from *globosicornis* in its more yellowish color and in having the funicle joints much less moniliform. The fore-wings in both sexes have a median discal row of six to eight strong setae on the apical half.

136. **Leimacis peregrina** Perkins.

Described in 1910 from specimens taken in Honolulu. I have not seen this species.

137. **Gonatocerus mexicanus** Perkins.

Recorded by Mr. Swezey in 1916 from specimens reared from the eggs of *Draeculacephala mollipes* (Say) collected at Kapiolani Park, Honolulu, on August 26 and 27, 1915; one female was taken by Mr. Swezey on sugar-cane in Honolulu on October 14, 1914.

138. **Gonatocerine.**

One female taken by Mr. Swezey on a window in Honolulu on November 28, 1915, has the antennae very long, slender and ten-jointed. The fore-wing is clavate, with a long fringe only at the apex and with about three irregular rows of discal setae on one surface and two submarginal rows on the other surface, each row being composed of about six setae and confined to the broadened apical part of the wing. The specimen is only 0.24 mm. long and has the antennae, legs, and wings considerably longer than the body. Another specimen was taken by me in the entomological laboratory of the Sugar Planters' Station on March 25, 1924.

139. ***Anagrus frequens** Perkins.

Introduced in 1904 from Queensland and now common and widely distributed in the Islands. It attacks the eggs of other Delphacids besides *Perkinsiella,* and has been reared from the eggs of *Peregrinus maidis* (Ashm.), *Sogata paludum* (Kirk.), *Kelisia sporobolicola* Kirk., and *Liburnia leahi* (Kirk.). This species has been synonymized with *A. armatus* (Ashmead) by Mr. Girault, and perhaps correctly so, although I prefer to use the name *frequens* at present.

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* Purposely introduced insects are starred throughout the list.

140. **Anagrus** sp.

Recorded by Fullaway in 1917 from specimens reared from the eggs of *Peregrinus maidis* on corn in Honolulu in the summer of 1916. This species is black, with the base of the abdomen yellow, and the wings are very broad as compared with *frequens*.

141. ***Paranagrus optabilis** Perkins.

Introduced in 1904 from Queensland and widely distributed in cane fields throughout the Islands, although now much less common since the introduction of *Cyrtorhinus mundulus* (Breddin).

142. ***Paranagrus perforator** Perkins.

Introduced in 1904 with the preceding species, but lost sight of in recent years. The only specimens that I have seen were reared from the eggs of *Aloha impomoeae* Kirkaldy collected by Mr. Swezey in Makiki Valley, Oahu, on March 2, 1906.

143. ***Paranagrus osborni** Fullaway.

Introduced in 1916 from Los Baños, Luzon, Philippine Islands, as a parasite of *Peregrinus maidis* (Ashm.). It is probably well established, although difficult to distinguish from *optabilis*.

144. **Polynema reduvioli** Perkins.

It was reared by Mr. Swezey on August 20, 1905, from the eggs of *Reduviolus capsiformis* (Germ.) in Honolulu; found by Mr. Terry at Kilauea, Koloa and Makaweli, Kauai, in November and December, 1905; recorded by Dr. Perkins in 1910, also from Hawaii; collected by Mr. Fullaway in April, 1923, on Sand and Eastern Islands, Midway, and on Ocean Island. I presume that the Mymarid, recorded by Fullaway in 1914 from Laysan, is this same species.

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* Purposely introduced insects are starred throughout the list.

Notes on Hawaiian Aphidae, With a List of Food Plants (Homoptera).

BY P. H. TIMBERLAKE.

(Presented at the meeting of December 6, 1923.)

The number of aphid species occurring in Hawaii is not great, but some of them are of considerable economic importance, among which should be mentioned *Aphis sacchari, A. maidis, A. gossypii,* and *A. medicaginis.* Some, such as *Macrosiphum solanifolii,* which are important pests elsewhere, confine themselves almost exclusively to weeds and are, therefore, negligible here in an economic sense. The thirty-seven species now known from the Islands are apparently all introduced, and there is no absolute certainty that there was any aphid fauna at all in the Islands before the establishment of commercial relations with the outside world in the early part of the nineteenth century.

The purpose of these notes is primarily ecological, or to provide a working list of the species, together with their food plants. I have, therefore, not attempted to describe any of the species which are apparently new, but in the case of species of uncertain identity I have found it desirable to place on record a few simple characters by which they may be distinguished from their congeners present in the Islands. The classification employed is mainly that of Mr. A. C. Baker (U. S. Dept. Agric. Bull. No. 826, 1920), but with some modifications where Mr. Baker's treatment seems somewhat too rigid. My thanks are due to Mr. Baker for the identification of several species.

Subfamily Aphinae.

Tribe Lachnini.

1. **Lachnus tujafilinus** (Del Guercio).

This species has been discovered recently by Mr. Ehrhorn, who found apterous colonies on *Thuya occidentalis* L. in Manoa Valley, Oahu, at the last of January and during February, 1924. On account of the peculiar marking of the apterous form of this species, I believe that there is no doubt about the identification.

TRIBE CALLIPTERINI.

2. **Myzocallis kahawaluokalani** Kirkaldy.
Kirkaldy, 1907, Proc. Haw. Ent. Soc. 1, p. 101.

This species has not been found since Kirkaldy's description was published in 1907, and is unknown to me. It was described from specimens taken on the crepe myrtle, *Lagerstroemia indica* L., and was reported by Kirkaldy to occur on other shrubs in Honolulu, the identity of which was not made known.

TRIBE APHINI.

3. **Anuraphis helichrysi** (Koch).
Aphis myosotidis Fullaway, 1910, Ann. Rep. Haw. Agric. Exp. Sta. for 1909, p. 42.

This is the common species on *Erechtites*, and is sometimes found on *Gnaphalium purpureum* L. Both of these plants are introduced weeds, and the aphid, therefore, has no economic interest. It is known to occur on Oahu, Kauai, and Maui.

4. **Aphis sacchari** Zehntner.

This species is common throughout the Islands on sugarcane (*Saccharum officinarum* L.) and sometimes occurs in large infestations, but is generally a pest of minor importance due to its control by predaceous enemies. Mr. Fullaway found a colony on sorghum (*Andropogon sorghum* Brot.) in Honolulu in August, 1916, but its occurrence on this plant is evidently rare.

5. **Aphis maidis** Fitch.

This is a very common species on corn (*Zea mays* L.), various varieties of sorghum, Sudan and Tunis grass (*Andropogon sorghum* Brot.), wonder forage grass (*Andropogon* sp.), pearl millet (*Pennisetum glaucum* (L.) R. Br.), and Guatemala grass (*Tripsacum laxum* Nash.). It has been found in the Islands also on the following non-cultivated plants and weeds: Club rush (*Scirpus maritimus* L.), Job's tears (*Coix lacryma-jobi* L.), goose grass (*Eleusine indica* Gaertn.), fox tail grasses (*Chaetochloa lutescens* (Weigel) Stuntz and C. *verticillata* (L.) Scribn.), crab grasses (*Syntherisma pruriens* (Trin.) Arthur and *S. sanguinalis* (L.) Dulac), and barnyard grass (*Echinochloa crusgalli* (L.) Beauv.).

The economic importance of this pest is greatly increased by its transmission of mosaic disease from its normal hosts to sugar-cane. This phase of its activity has been investigated by Dr. Kunkel, and many of the above records of food plants are due to his work. Although the corn aphis does not establish colonies on sugar-cane in the Hawaiian Islands, immigrants undoubtedly settle on the cane plants and are able to live long enough to transmit disease. Forced but unsuccessful migrations to cane also take place when infested grasses are weeded out in the cane fields.

6. **Aphis middletonii** Thomas.

This is a root-inhabiting species on various Compositae and has been found in Honolulu on cultivated *Coreopsis* and China aster (*Callistephus chinensis* (L.) Nees).

7. **Aphis gossypii** Glover.

The cotton aphis, which, according to Van der Goot, is the *Aphis malvae* Walker of European authors, is one of our commonest and most destructive species. Its food plants are very numerous, and the list given herewith might be greatly increased by careful collecting. Among cultivated plants, it has been found in the Islands on cotton (*Gossypium barbadense* L.), *Cucumis,* taro (*Colocasia antiquorum* var. *esculenta* Schott), *Caladium bicolor* Vent., Hibiscus (*Hibiscus rosa-sinensis* L. and hybrids), *Clerodendron* sp., egg plant (*Solanum melongena* L.), pink and white shower (*Cassia nodosa* Ham.)., periwinkle (*Vinca rosea* L.), avocado (*Persea gratissima* Gaertn.), Ageratum (*Ageratum houstonianum* Mill.), hybrid of *Plumieria rubra* L., sunflower (*Helianthus annuus* L.), marigold (*Tagetes erecta* L.), Mexican creeper (*Antigonon leptopus* H. and B.), Zinnia (*Zinnia elegans* Jacq.), Ixora (*Ixora macrothyrsa* Theijsm. and Binn.), and hollyhock (*Althaea rosea* Cav.).

It also occurs in more or less abundance on the following weeds: *Bidens pilosa* L., *Cuphea hyssopifolia* H. B. and Kunth., *Waltheria americana* L., *Cassia bicapsularis* L., *Solanum nodiflorum* Jacq., *Malvastrum coromandelinum* (L.) Garke, *Malva parviflora* L., *Ipomoea pentaphylla* Jacq., *Desmodium uncinatum* D C., *Crotalaria incana* L., *Erechtites, Stachytarpheta dichotoma*

Vahl., *Euphorbia pilulifera* L., *Euphorbia* sp., *Sida cordifolia* L., and *Sida rhombifolia* L.

It was also found on a native Mucuna vine (*Mucuya* sp. near *urens* (L.) Medic.) on the Ditch Trail near Keanae, Maui, in July, 1920 (Swezey).

8. **Aphis** sp.

A bright orange-yellow species of *Aphis,* very similar to *Aphis gossypii* in structure, has been observed on *Waltheria americana* L. on the island of Oahu. Even the alate form has the abdomen bright yellow. The species is distinguished from *gossypii* by the coloration and by the different proportions of the antennal segments in the alate viviparous form.

9. **Aphis medicaginis** Koch.

Aphis papaveris Silvestri, 1909, Bol. Quind. Soc. Agr. Ital. 14, p. 344.

Aphis gossypii Fullaway, 1910, Ann. Rep. Haw. Agric. Exp. Sta. for 1909, p. 39 (in part).

Aphis medicaginis Higgins, 1910, Ann. Rep. Haw. Agric. Exp. Sta. for 1909, p. 54.

The first record of this pest under its correct name was by Higgins, in 1910. It was confused by Fullaway with *Aphis gossypii,* but is easily distinguished by the shiny black color and reticulate derm of the apterous females.

It has been found on the following cultivated plants: Various beans (*Phaseolus* spp.), Cowpea (*Vigna cylindrica* (L.) Merrill), pigeon pea (*Cajanus cajan* (L.) Millsp.), hyacinth bean (*Dolichos lablab* L.), and the night-blooming Cereus (*Cereus triangularis* (L.) Haw.). It is especially destructive to cowpeas.

It also occurs on the following weeds: *Portulaca oleracea* L., *Medicago denticulata* Willd., *Indigofera suffruticosa* Mill., *Euphorbia pilulifera* L., *Datura stramonium* L., *Tribulus cistoides* L., and *Acacia farnesiana* (L.) Willd. It was found on *Tribulus* on the outlying islands by the members of the Tanager Expedition in 1923.

10. **Aphis** sp.

A heretofore unrecorded and as yet unidentified species of *Aphis* was taken February 25, 1917, in large numbers on *Cam-*

pylotheca macrocarpa (Gray) Hbd. on the Manoa Cliff trail on Mt. Tantalus, Oahu.

It is distinguished from other species occurring here except *Aphis bambusae* and the following species on *Scirpus* by having secondary sensoria on the third to fifth antennal joints and from *bambusae* by the greenish-yellow color of the apterous phase which lacks a white waxy secretion and by the longer cornicles which are about as long as in *Aphis medicaginis.*

11. **Aphis** sp.

A yellow species on *Scirpus maritimus* L. was taken by Mr. Swezey in April, 1913, at Kewalo, in Honolulu. In many ways it is close to the preceding species on *Campylotheca,* but the antennae of this species are longer and wholly yellow, whereas the last four joints are black in the other species.

12. **Aphis swezeyi** Fullaway.

This species recorded by Fullaway on *Gnaphalium* sp. has not been collected since.

13. **Aphis bambusae** Fullaway.

Melanaphis bambusae Van der Goot, 1916, Zur Kenntniss der Blattläuse Javas, p. 61.

This species was found by Fullaway on a bamboo which was believed to be a species of *Phyllostachys.* It has been wrongly accredited to Kirkaldy by Van der Goot, and more recently by Baker.

14. **Brevicoryne brassicae** (Linnaeus).

The cabbage Aphis occurs here rather sparingly on cabbage (*Brassica oleracea* L.) and kale (*Brassica* sp.), and is sometimes found on *Capparis sandwichiana* D C.

15. **Toxoptera aurantii** (Fonscolombe).

This species is found commonly in the mountains of Oahu, generally at an elevation of 1500 to 2000 feet on various species of endemic trees and shrubs of which the following have been noted, although the list is by no means complete: *Scaevola chamissoniana* Gaud., *Pittosporum glabrum* Hook. and Arn., *Hibiscus arnottianus* Gray, *Pelea* sp., and *Straussia* sp.

It also occurs on the following cultivated or escaped shrubs and trees: Coffee (*Coffea arabica* L.) and mango (*Mangifera indica* L). The record on mango is based on a small colony found at Kaimuki, May 24, 1920, which is the only time that the species has been discovered in the coastal lowlands, to the writer's knowledge, except that a single-winged migrant was taken by Fullaway in October, 1922, on *Ixora macrothyrsa* Theijsm. and Binn. It has never been seen on Citrus in the Islands, probably because of its rarity in the lowlands, where most of the Citrus trees are grown.

16. **Vesiculaphis caricis** (Fullaway).

Toxoptera caricis Fullaway, 1910, Ann. Rep. Haw. Agric. Exp. Sta. for 1909, p. 32.

Vesiculaphis caricis Del Guercio, 1911, Redia, 7, p. 464.

This peculiar aphid was discovered by Fullaway on a sedge (*Carex* sp.) in the mountains back of Honolulu.

17. **Yamataphis oryzae** Matsumura.

Matsumura, 1917, Jour. Coll. Agr. Tohuku Univ. 7, p. 412.

A single alate female was taken by me while riding on a street-car between Kaimuki and Moilili, in Honolulu on March 24, 1924. This specimen agrees very well with Matsumura's description, and I believe the identification is certain, notwithstanding the limited material on which it is based. The species was discovered by Matsumura at Sapporo, Japan, on the roots of rice (*Oryza sativa* L.).

18. **Myzaphis** sp.

The apterous phase of this species is sometimes common on cultivated rose-bushes in Honolulu, and was first noticed in 1916, but the alate form was not discovered until March, 1923. In Theobald's table of rose aphids (Bull. Ent. Research, 6, p. 112, 1915) it runs to *neorosarum* Theobald, a new name for *rosarum* Buckton (not Kaltenbach), but it is apparently not that species. According to Buckton, *neorosarum* has black marks on the abdomen in the alate phase which is not true of the Honolulu species, and the capitate hairs of the body are more nearly as in *rosarum* (Kaltenbach) as figured by Theobald.

19. **Capitophorus braggii** (Gillette).

This species was discovered on artichoke (*Cynara scolymus* L.) April 12, 1923, by Mr. Swezey, in the Manoa Valley, Oahu.

20. **Amphorophora lactucae** (Kaltenbach).

This species was first noticed by the writer in Honolulu in November, 1922, and has since been found widely distributed on Oahu. It is now very common on *Sonchus oleraceus* L., and seems to have replaced *Macrosiphum solanifolii* on this food plant.

21. **Myzus citricidus** Kirkaldy.

This species recorded and described by Kirkaldy in 1907 (Proc. Haw. Ent. Soc. 1, p. 100) occurs abundantly on the tender growth of various species of Citrus on Oahu, and probably on most of the other Islands.

22. **Myzus** sp.

A small species apparently belonging to the genus *Myzus* was taken by Mr. Fullaway on bamboo, in Honolulu, on two occasions in the winter of 1917-1918. The material preserved is not sufficient for the identification of the species, but indicates that it is different from all other aphids known to occur here.

23. **Myzus persicae** (Sulzer).

The common peach aphis of the United States and Europe has so far been found in Hawaii only on cabbage (*Brassica oleracea* L.), kale (*Brassica* sp.), papaya (*Carica papaya* L.), and *Datura stramonium* L.

24. **Aulacorthum** sp.

This green *Aulacorthum* has the cornicles with about three to five rows of coarse irregular reticulations at the apex, the third antennal joint with about fifteen to nineteen sensoria in a row, the fourth joint with five or six sensoria, while the apterous phase has only about six sensoria in a row on the basal half of the third antennal joint. It is very close to *A. rosaefolium* (Theobald), but distinct in having much fewer sensoria on the third antennal joint of the apterous females. It apparently differs from any species of aphid so far recorded from rose-bushes.

This species infests cultivated rose-bushes (*Rosa,* hybrids)

and largely replaces *Macrosiphum rosae* in the lowlands of the Islands. I have found it on roses in Honolulu and on Tantalus, Oahu, and at Wailuku, Maui, and also collected it on rose-bushes at Whittier, California, in 1912.

25. **Aulacorthum circumflexum** (Buckton).

Circumflexum was discovered by Mr. Fullaway on poha (*Physalis peruviana* L.) on Tantalus, Oahu, and I have since taken it on one of the native shrubby violets (*Viola* sp.) in the Punaluu Mountains, Oahu, and on *Phyllostegia grandiflora* Benth. on Mt. Kaala, Oahu, at about 3000 feet. It has also been taken on pansies (*Viola tricolor* L.) in Honolulu by Mr. Fullaway.

Van der Goot makes this species the type of his genus *Neomyzus,* but it seems to me to agree in every respect with *Aulacorthum,* as the apterous females examined by me have one or two small sensoria on the third antennal joint.

26. **Aulacorthum** sp.

In 1918, Mr. Fullaway collected, on an unidentified composite on Maui, a green *Aulacorthum* without dark markings, which agrees almost exactly with *circumflexum* in structural details and in the color of the legs, cornicles and antennae. In March, 1920, he took what is apparently the same species on ferns at Kilauea, Hawaii.

27. **Aulacorthum** sp.

A small colony consisting entirely of apterous females was collected on a fern (*Polypodium* sp.) in the native forest on the Pauoa trail, Tantalus, Oahu, in February, 1916. The species is green, with the cornicles, antennae, excepting the first two joints and base of the third joint, the apex of the tibiae and the tarsi blackish. The frontal tubercles appear to be somewhat shorter than is usual for the genus, but they are gibbous on the inner side, the third antennal joint bears one or two sensoria near the base, and the cornicles are slightly tapering and transversely imbricated and imperfectly reticulated at apex. The identification of the species must rest until the alate form is discovered.

28. **Macrosiphoniella sanborni** (Gillette).

This aphid occurs on florists' Chrysanthemum (*Chrysanthemum hortorum*) in Honolulu, and was first recorded by Fullaway in 1910.

29. **Macrosiphum rosae** (Linnaeus).

The common rose aphid was recorded by Fullaway from Honolulu, Oahu, and from Mana and Puuopelu, Hawaii (2000 to 3500 feet). I have found but one specimen of it in Honolulu, but have seen it abundant on cultivated roses at Mountain View and Kilauea, Hawaii.

30. **Macrosiphum solanifolii** (Ashmead).

Macrosiphum trifolii Fullaway, 1910, Ann. Rep. Haw. Agric. Exp. Sta. for 1909, p. 23 (not Pergande, 1904).

For the determination of this species I am indebted to Mr. A. C. Baker, with whom I agree after comparing Hawaiian specimens with a long series collected in Texas, Utah, and California, on potato, rose, alfalfa, *Sonchus, Lactuca scariola* L., *Malva parviflora* L., *Citrus, Erodium cicutarium* L'Herit., and cultivated strawberry. I believe that *Macrosiphum creelii* Davis, described from specimens taken on alfalfa, is a synonym.

This species was formerly abundant in the lowlands on *Sonchus oleraceus* L., but I have been unable to find it during the last two years. On one occasion I discovered a small but vigorous colony on *Portulaca oleracea* L., and in January and February, 1920, I found small colonies on corn (*Zea mays* L.) in Manoa Valley, located mostly on the basal part of the stalk and on the lower leaves of vigorously growing plants.

31. **Neotoxoptera violae** (Pergande).

A species, believed by Fullaway to be the one described by Pergande, was taken by him on Tantalus, Oahu, on cultivated violets (*Viola odorata* L.). It has not been found since.

32. **Idiopterus nephrolepidis** Davis.

Macrosiphum kirkaldyi Fullaway, 1910, Ann. Rep. Haw. Agric. Exp. Sta. for 1909, p. 22, figs. 1-2.

Fullawayella kirkaldyi Del Guercio, 1911, Redia, 7, p. 462.

Nephrolepidis is a common species in the mountains back of Honolulu on *Acrostichum reticulatum* Kaulf., *Polypodium lin-*

eare Thunb. and doubtlessly several other species of ferns, and has been taken on ferns at Kilauea, Hawaii, by Fullaway.

The genus *Fullawayella* has been misunderstood by Baker, who wrongly uses it to replace *Neotoxoptera* Theobald and *Micromyzus* Van der Goot. Essig has also stated that *nephrolepidis*, without doubt, is a native of the Hawaiian Islands, and that it has been introduced from there into the United States. There is, however, no local evidence that *nephrolepidis* is endemic to the Islands, and I believe that it has been introduced here as likewise in the United States on imported plants.

33. **Pentalonia nigronervosa** Coquerel.

Nigronervosa is a not uncommon species on banana of various kinds (*Musa* spp.) in Honolulu, and presumably occurs throughout the Islands in the lowlands. It was also found by Mr. Fullaway in June, 1922, on ferns in Honolulu.

SUBFAMILY ERIOSOMATINAE.

34. **Eriosoma lanigerum** Hausmann.

Fullaway has recorded the woolly aphis from apple trees (*Pyrus malus* L.) at Waikii, Hawaii (4500 feet), and more recently Mr. Ehrhorn reported on finding the species at the same locality (Proc. Haw. Ent. Soc. 5, p. 18, 1922).

SUBFAMILY HORMAPHINAE.

35. **Cerataphis lataniae** (Boisduval).

This species occurs on the loulu palm (*Pritchardia* sp.) in Honolulu, and one or two trees at the College of Hawaii have been continuously infested for several years. It has been found by Dr. Lyon also on greenhouse orchids at the Moanalua gardens near Honolulu.

36. **Thoracaphis ficus** Baker.

Baker, 1920, U. S. Dept. Agric. Bull. No. 826, pl. 16, figs. Q, R.

Fullaway (Proc. Haw. Ent. Soc. 4, p. 471, 1921) has recorded the occurrence of this species on *Ficus* in Honolulu, under the name of *Thoracaphis fici* Van der Goot, which is apparently a manuscript name. It occurs frequently on the banyan tree (*Ficus Benghalensis* L.) about Honolulu.

37. Undescribed Aphid on **Araucaria.**

An undescribed and peculiar aphid was reported by the writer as occurring on the Norfolk Island pine (*Araucaria excelsa* R. Br.) in 1916 (Proc. Haw. Ent. Soc. 3, p. 267). It belongs to a new genus, apparently of the subfamily Hormaphinae, and can hardly be confused with any other Hawaiian species.

New and Little Known Fulgorids from the West Indies (Homoptera).

BY F. MUIR.

(Presented at the meeting of November 1, 1923.)

From time to time Mr. G. N. Wolcott has forwarded to the writer fulgorids from Porto Rico and other West Indian Islands; some of these he named at the time of their reception, others he placed on one side for future study. Among the latter the following appear to be undescribed, or needing some comment. A study of the male genitalia of the species reported as common to various West Indian Islands and the mainland is very desirable, and is likely to show a higher endemism than has hitherto been evident.

CIXIIDAE.

Cubana tortriciformis sp. nov.

Female. Length, 5 mm.; tegmen, 8 mm.

The base of the vertex not quite so angularly emarginate as in the type. Brown, the carinae of head and thorax lighter brown or yellow, legs light brown, abdomen light brown, slightly infuscate. Tegmen light brown or stramineous, with lighter and darker markings; the darker brown markings are, one from base of costa over first claval vein, a large, irregular V-shape mark with its apex near Mf, and one arm touching the mark over the first claval vein and the other reaching the middle of costa; a small mark across costal cell slightly more distad, a fainter one at base of stigma and continued in a curve to apex of clavus, another subparallel to last starting distad of stigma, where it is broadest, a broader dark mark over apical Sc and R reaching to M, a thin line slightly apical to that; at apex between M3 and 4 a black round mark. The veins dark in dark area and lighter in light area; the middle of the subapical cells semihyaline, wings slightly fuscous and opaque, veins brown.

One female from Mameyes P. R., 3000 feet elevation, Acc. No. 29-1924 (G. N. Wolcott).

This is the third species to be placed in this genus, the other two being from Cuba. The genus is near to *Cotylepceps,* but can be recognized from it by the longitudinal median carina on vertex.

Type in the National Museum, Washington.

Derbidae.

Cedusa wolcotti sp. nov. Plate XII, Figs. 1, a.

Male. Length, 2 mm.; tegmen, 3.3 mm.

Vertex slightly longer than in type species, a faint carina dividing it from frons; lateral margins of frons straight, subparallel sided or frons slightly broader at apex than at base, a faint median frontal carina; subantennal plate large, typical; shoulder keels distinct, but small. Tegmina slightly narrower than type species, apex more rounded, venation with one apical M (M 1c) missing, apical cells shorter.

The anal angle of pygofer produced into a long, narrow process, lateral margins ventrad of process concave; anal segment long, narrow, anus slightly basad of middle, broadest at base gradually narrowed to truncate apex, the apex has the appearance of being cleft in middle and afterwards joined together, in some specimens there is a little hole through the middle near apex; genital styles large, broad, the apex broadly rounded with a small process on outer margin near base, and a broad longitudinal median ridge from base to the inner margin near apex, inner margin slightly convex, entire; the apex of the left style is cleft nearly across and produced into a small spine, the right style being entire at apex and without spine.

Stramineous, slightly darker over apical portion of mesonotum. Tegmina hyaline, slightly opaquely white; clavus, apical cells and Cu area slightly fuscous, a black mark at apex of Cu, smaller one at apices of apical cells; veins same color as membrane. Wings opaquely white, M and A veins brown, others white.

Female. Similar to male. The pregenital plate (seventh sternite) produced from side to middle, sides of produced portion sinuous, apex rounded.

Described from twenty-three males and five females from Yauco, Porto Rico (*G. N. Wolcott*, August 24, 1923; Acc. No. 236), feeding on a palm. Type No. 1135, in Hawaiian Sugar Planters' Experiment Station collection; paratypes in U. S. National Museum, Washington, and G. N. Wolcott's collection.

Dysimia gen. nov.

Sc+R+M forming a common stalk on the basal fifth, Sc+R fork a little basad of the middle and level with M fork; Sc cell fairly long and narrow; M with seven apical veins, pectinate or subpectinate, the first or basal sector furcate near base, the second furcate near apex, the third and fourth arising near together at apical cross-veins; the Cu with three veins entering hind margin, Cu fork slightly before apex of clavus, Cu1 forked near apex; clavus closed, claval veins forking on basal third, entering

commissure near apex of clavus. Hind-wing more than half the length of tegmen, anal area well developed with anal veins.

Vertex small, triangular, lateral carinae large, meeting together at apex. Base of frons narrow with lateral carinae touching, gradually widening to apex, lateral carinae large, curved under the antennae, but do not form a subantennal process. Clypeus shorter than frons, rounded. In profile vertex and frons forming a curve. Pronotum angularly emarginate posteriorly, very short in middle, no shoulder carinae or only a very slight indication of any; mesonotum broader than long, without carinae. Antennae shorter than frons, first segment wider than long, length of second segment about twice the width, apex slightly larger than base. Female genital style small, but complete. Hind tibiae with two or three small spines, which are missing in some specimens.

This genus stands between *Symedia* and *Mysidia*, but, as it has only three Cu veins reaching the hind margin, and the sectors of M are not incorporated into the Cu, it must be placed in the Cenchreini. It differs from *Symedia* in having no shoulder keels, the Cu with three branches instead of two, the basal M sector two-branched instead of three, and the second M sector two instead of one branch; wings are also proportionately much larger. In *Dawnaria* Dist. the M is not pectinate and in *Phenice* Cu has two branches, the first M sector two, and the others are simple.

Type *D. maculata.*

Dysimia maculata sp. nov. Plate XII, Figs. 2, a.

Male. Length, 1.5 mm.; tegmen, 3.6 mm.

Stramineous; genae in front of eyes, the middle of mesonotum and basal portion of abdominal tergites fuscous, fuscous over lateral portions of pronotum, a small dark mark on tegulae sometimes forming a distinct spot. Tegmina hyaline, slightly opaque with waxy secretion and very slightly fuscous, especially over apical cross-veins and in apical cells, veins stramineous with fuscous marks; four black spots on tegmen, the largest on Cu1a, a smaller one at base of Cu1, another in costal cell at base of Sc+R fork and a very small one on M basad of first sector. Wings hyaline, veins stramineous with fuscous markings, a round black spot between Cu and A.

Anal segment small, anus near base, lateral edges curved ventrad. Inner margins of genital styles slightly concave on basal half and convex on apical half, outer margin produced angularly in middle, the apex of the angle produced into a thin, curved process.

Female. Length, 1.9 mm.; tegmen, 4 mm.

In color similar to male, the fuscous on tegmen a little darker, and the

abdominal tergites lighter. Hind margin of pregenital plate turbinate or angular with curved sides, reaching nearly to apex of styles.

Described from thirty-five males and twelve females, feeding on two species of *Inga*: *I. vera* and *I. laurina* (*G. N. Wolcott*, August, 1922, Acc. No. 279-23).

Type in H. S. P. A. Experiment Station collection, Honolulu, No. 1136; paratypes in U. S. National Museum, Washington, and G. N. Wolcott's collection.

DICTYOPHARIDAE.

Parahydriena gen. nov.

Sc+R fork and M fork at cross-veins, M4 appearing as arising from cross-vein, Cu fork considerably basad of these, about one-third from apex of clavus, M1 and 2 fork at apical cross-veins, M with five apical veins, 1, 2, 3, 4, 4 a; a single line of apical cross-veins; clavel fork about one-third from base, apex entering commissure near apex, no cross-veins in clavus; Sc+R+M making a short stalk at base. Apical half of vertex in the middle raised into a deep keel which in profile is subangular; frons long, narrow, base half the width of apex, basal third subparallel sided beyond which widening with sides slightly arcuate, widest before apex; lateral margins keeled, two median longitudinal carinae which meet together at apex; clypeus tricarinate. Pronotum short in middle with a median carina, wider at sides with a single, curved carina behind eyes; mesonotum tricarinate, carinae straight, laterals slightly diverging posteriorly, posterior angle divided off by a slight depression, but not by a suture or line. Front legs simple, not expanded, front tibiae and femora subequal in length, without spines; hind tibiae with three spines on apical half.

This genus approaches *Hydriena* Melichar in having two medio-frontal carinae, but the shape and nature of the elevated portion of the vertex appear to differ, and the front legs are not exceptionally long.

Type *P. hyalina*.

Parahydriena hyalina sp. nov. Plate XII, Figs. 3, a, b, c.

Female. Length, 4.2 mm.; tegmen, 5.7 mm.

Yellow or light stramineous; carinae of head, sides of clypeus, lateral portion of cephalic projection and sides of head below it dark, also dark over carinae of thorax, a thin line in middle of lateral portions of pronotum, a dark mark over coxae and pleura of thorax; the apical half of abdominal tergites and fifth, sixth, and seventh sternites dark. Tegmina and wings clear hyaline, veins light brown.

Anal segment longer than broad, in outline basal half slightly concave, apical half slightly convex, apex slightly arcuately emarginate; anus in apical half. Posterior genital styles laterally flattened, triangular, excavate in middle, apex with a number of spines curved inward; median and anterior styles covered by posterior styles.

One female specimen from Lares, Porto Rico (*G. N. Wolcott,* June 14, 1921, Acc. No. 130, 1921).

Type in U. S. National Museum, Washington.

ISSIDAE.

Colpoptera brunneus sp. nov. Plate XII, Figs. 4, a, b, c, d.

Male. Length, 3.7 mm.; tegmen, 4.6 mm.

Dark brown, lighter over genae, lighter spots in middle of frons, over carinae of head and thorax, legs lighter. Tegmina dark brown, light brown over costal area and cell, and a few small, light marks in clavus; veins same color as membrane except apical veins which are light, a light mark at stigma and at apex of clavus. Wings fuscous, slightly lighter at base, veins dark. The tegmina are generally covered with a light powdery secretion.

In lateral view lateral margins of pygofer straight or slightly concave, anal angle rounded, not produced. Anal segment fairly large, anus in middle, apex rounded. Genital styles large, subtriangular, two ridges running across apical half, outer margin irregularly sinuate. Periandrium forming a tube, deeply and narrowly emarginate, or cleft, on ventro-apical margin, with a long, thin process arising from the bottom of the emargination (Figs. 4, a), and from each side of the emargination arises a bifurcate, spine-like process; the penis is large, membraneous or but slightly chitinized, with a pair of curved spines about middle of ventral aspect.

Female. Similar in size and color to the male. The tegmina of this species has the costal vein leaving the costal margin one-fourth from the base and forming a narrow costal area without cross-veins; the Sc and R simple, and forming a short stalk; M bifurcate about middle, M3+4 joining R for a short distance; Cu forking near apex. In the hind wings there is an emargination at the apex of Cu, as well as one in middle of anal area; no granules on the clavus. Vertex much wider than long, truncate at apex, slightly concave at base. Basal margin of pronotum widely angularly emarginate, lateral carinae following hind margin of eyes.

Described from three males and two females from Utuado, P. R. (*G. N. Wolcott,* November, 1921, Acc. No. 475), one male and two females (type locality), one male from Toa Alta (*G. N. Wolcott,* April 21, 1921, Acc. No. 105, 1921), and one male

from Cicales, P. R. (*G. N. Wolcott,* March 24, 1920, Acc. No. 65, 1921).

Type in H. S. P. A. Experiment Station, Honolulu; paratypes in U. S. National Museum, Washington, and G. N. Wolcott's collection.

Colpoptera maculifrons sp. nov.

Male. Length, 3.8 mm.; tegmen, 5.4 mm.

Light brown; slightly darker at base on lateral portion of frons, a series of seven or eight lighter spots curving from the outer angles of base to near apex in the darker portion of frons; pronotum slightly mottled with darker marks; mesonotum considerably darker. Tegmina light brown, slightly darker in middle, veins same color as membrane except in middle, where the Sc, R, M, and Cu from one-third from base to near nodal line are dark brown or black. Wings brown with darker veins.

Anal segment long, narrow, anus at base where it is broadest, gradually narrowing to acute apex. Genital styles somewhat similar to former species, but the apex (corresponding to x in Fig. 4) is produced into a spine with its apex bifurcate and pick-shape.

Vertex considerably wider than long, apex very slightly arcuate, base slightly, roundly emarginate. In this species there is a very slight sign of transverse veins in the costal area.

Described from one male from Rio Piedras, P. R. (*R. T. Cotton,* 2, 10, 1917).

Type in U. S. National Museum, Washington.

The genus *Colpoptera* Burmeister is difficult to place; it has been placed in the Issidae, Ricaniidae, and Flatidae by different workers. The absence of any sign of granules on the clavus should exclude it from the Flatidae, and the male genitalia are not typical of that family. The absence of a distinct costal area with distinct cross-veins should also exclude it from the Ricaniidae, and the eyes nearly touch the tegulae. If it should be placed in the Ricaniidae it would come near to *Bladina,* in which the costal area is obscure. Personally, the writer prefers to place it in the Issidae until such time as the morphology of that family has been more thoroughly worked, and it should go into the Thioniini.

ACANALONIIDAE.

Acanalonia brevifrons sp. nov. Plate XII, Figs. 5, a, b.

Female. Length, 6.9 mm.; tegmen, 8.6 mm.

Vertex wider than the length in middle, apex widely angular or subangular; frons much wider than long. No costal area; Sc and R arising from the same spot on basal cell, Mf near base, fork of M3+4 very near to Mf, Cu without a fork. Anal segment sublanceolate, anus in middle; posterior genital styles large, triangular, the apex swollen and roughened, but not bearing teeth.

Green; slightly brownish over vertex, more so on legs; costa light; apical margin from the apex of Sc to apex of clavus reddish brown with small light marks, slightly reddish along second claval and hind margin. Wings slightly greenish with green veins, slightly brownish over anal area.

Described from one male from Pt. Cangrojos P. R. (*G. N. Wolcott*, June 24, 1920, Acc. No. 234).

Type in U. S. National Museum, Washington.

In Melichar's latest classification of this family * this species would come into *Amphiscepa* Germar. But Van Duzee has pointed out that the type of this genus is an Issid and it is not available for Acanaloniidae. If Melichar's genus is maintained, then a new name must be given it.

FLATIDAE.

Tetraceratium gen. nov.

This genus is near to *Neocerus* Mel., but it is easily recognized by the deep angular emargination of the base of the frons, and a corresponding emargination of the anterior margin of the pronotum.

The cells of the costal area and the apical cells form a continuous margin from the base of the costa to the apex of the clavus; Sc, R, M, and Cu arising from basal cell, the forks of R, M, and Cu about equal distance from base; M branching out and its apical cells occupying the greater portion of apical margin; the branches of Cu pressed together at apex of clavus; claval veins forking near apex and entering commissure. The apex of vertex and base of frons deeply angularly emarginate, the vertex excavate, its base hidden by the pronotum; the width at base of frons, from tip to tip of the horns, double the width at apex, sides slightly sinuous, no carinae on frons, the edges slightly raised; clypeal suture obscure, clypeus without carinae. Basal segment of antennae as broad as long, second segment about twice as long as broad; eyes round without

* Wytsmann's Genera Insectorum, fascicule 182 (1923), p. 4.

antennal sinus, ocelli distinct. Pronotum excavate in middle, anteriorly produced into two processes corresponding closely to the two at apex of vertex, a small, raised process behind eyes, base of pronotum widely angularly emarginate; mesonotum about as long as wide, without carinae, hind tibiae with one spine near apex.

According to Melichar's latest arrangement of the Flatidae, this genus would form a new subtribe of the Nephesini. His subtribe Crytoflatini should be the typical subtribe, as it contains *Nephesa* Amy. Serv.

Type *T. wolcotti.*

Tetraceratium wolcotti sp. n. Plate XII, Figs. 6, a.

Female. Length, 7 mm.; tegmen, 8 mm.

Stramineous slightly tinged with green, in life probably green; veins of tegmen greenish; wings hyaline, opaquely white with waxy secretion, veins white.

Anal segment large, flat, thin, in outline oval, anus near apex; posterior styles of ovipositor small, longer than wide, apex slightly pointed; anterior styles triangular, small; posterior margin of pregenital plate slightly angular.

One female from Haina, Santo Domingo, R. D. (*G. N. Wolcott*, 1920, No. 31).

Type in U. S. National Museum, Washington.

Ormenis Stal.

In his recent work, Melichar has divided the old genus *Ormenis* into several genera. This would be good if his characters were more definite. In his table of the Cryptoflatini it is fairly difficult to follow certain characters; as an instance, the one or two transverse lines formed by the apical and subapical cross-veins are not always easy to recognize, especially the subapical line, which is often irregular, and the cross-veins indistinct. In the present paper the writer has retained the old generic conception and added remarks as to where they appear to come in Melichar's new classification. He believes that a better system for both the Ricaniidae and Flatidae could be arrived at if more advantage was taken of the venation of tegmina.

Ormenis quadripunctata (Fabr.).

There are six specimens from Porto Rico which agree with the descriptions of this species. There is no subapical transverse line.

Ormenis infuscata (Stal).

There are two specimens from Vega Baja, P. R. (*R. T. Cotton*, 8, 4, 16, Acc. No. 518-16), which the writer considers to be this species, judging by descriptions. The subapical transverse line could be considered as present, as it is fairly well developed, the cross-veins being fairly regular. If we consider this as a line, then it would be an undescribed genus near to *Acrophaca* Mel. The frons is wider than long, and there are two spines on the hind tibiae.

Ormenis marginata (Brunnich).

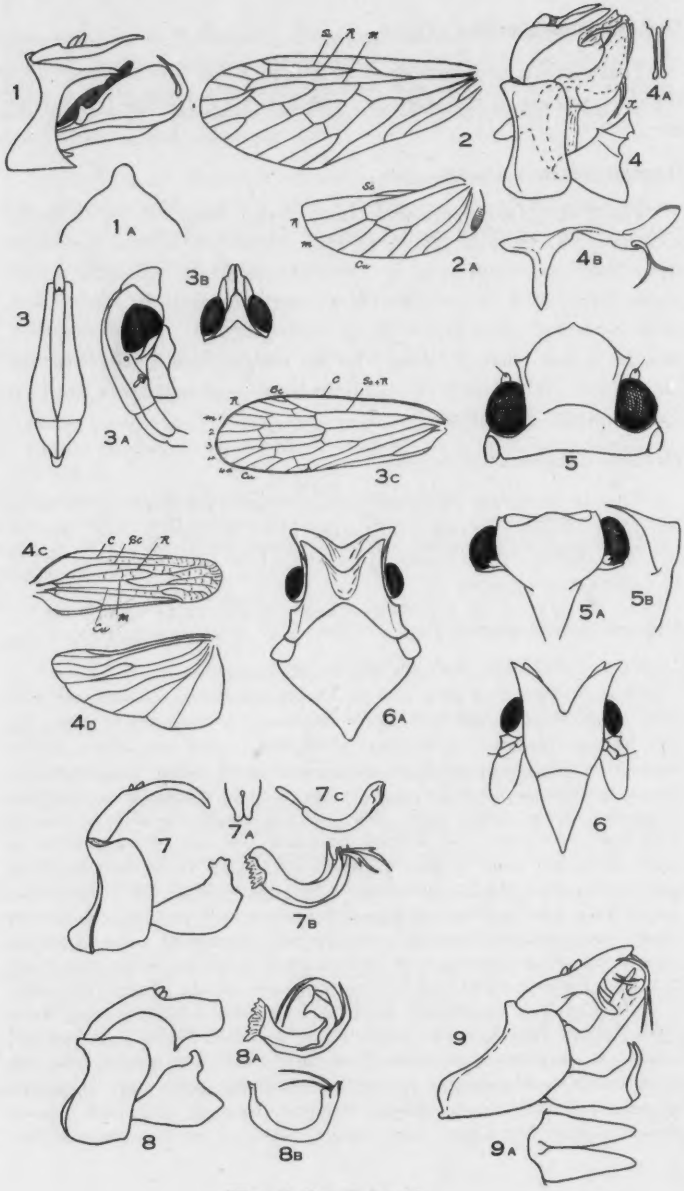
This is made by Melichar into a monotypic genus *Petrusina* in which there are two transverse lines in apical area, but in the specimens from Porto Rico the cross-veins are somewhat irregular and obscure.

Ormenis pseudomarginata sp. n. Plate XII, Figs. 7, a, b, c.

Male. Length, 2.7 mm.; tegmen, 4 mm.

Frons broader than long (1.3 to 1), median carina distinct on basal half, absent from apical half, lateral carinae only indicated at base, lateral margins carinate; no carinae on clypeus; vertex very short, mostly covered by pronotum; width of head equal to, or wider than, width of thorax, no carinae on mesonotum or only a slight indication at the base of median carina. Hind tibia with only one spine. Costal area distinct with transverse veins, and slightly granulate. Sc very strong, simple to apex; R arising from M near its base and forking about one-third from base of tegmen; Mf level with Rf, Cuf slightly basad of former two; granulations over the base of R and M obscure their junction. Nodal line slightly arcuate and formed by some irregular cross-veins and a slight depressed line across tegmen from node to apex of clavus; apical line fairly even and distinct; claval vein forking near apex, clavus strongly granulate.

Pronotum and mesonotum black or very dark fuscous brown, frons lighter brown, shading out to nearly yellow on sides, clypeus light fuscous; genae, antennae and eyes yellow; front and middle legs yellow, hind legs light brown, yellowish over apical half of tibiae and tarsi. Abdomen, pygofer and styles dark brown. Tegmina black or very dark fuscous brown, a white line along costal margin, narrowest at base where it only



West Indian Fulgorids.

covers about one-third of the width of costal area, broadening to apex where it covers the whole costal area; veins slightly lighter along nodal line. Wings fuscous with dark veins.

The periandrium is tubular with a pair of chitinous, bifurcate spines at apex; the penis is tubular with a chitinous rim at apex, but no process. The apex of anal segment is cleft for some little distance. The details of the genitalia are best understood by the figures.

Described from one male from Porto Rico (*R. T. Cotton*, January, 1917, Acc. No. 127-17), and one male from Lares P. R. (*J. More*, December, 1920, Acc. No. 150-20).

Type in H. S. P. A. Experiment Station, Honolulu, T. H., No. 1140; paratype in U. S. National Museum, Washington.

In Melichar's latest table this would run down to *Petrusina* Mel.

Petrusa pygmaea (Fabr.). Plate XII, Figs. 8, a, b.

The specimens the writer has before him from Porto Rico run down to *Petrusa* Stal in Melichar's latest table, and agree with his specific description in his monograph; they also agree with Stal's original specific description. Stal states that this genus has two transverse lines in the apical area of the tegmina,

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PLATE XII.

1. *Cedusa wolcotti*, lateral view male genitalia; *a*, female pregenital plate (seventh abdominal sternite).
2. *Dysimia maculata*, left tegmen; *a*, left wing.
3. *Parahydriena hyalina*, front view frons and clypeus; *a*, lateral view head and pronotum; *b*, dorsal view head; *c*, left tegmen.
4. *Colpoptera brunneus*, lateral view male genitalia; *a*, emargination at apex of periandrium with median process; *b*, lateral view penis and apodeme; *c*, right tegmen; *d*, left wing.
5. *Acanalonia brevifrons*, dorsal view head and pronotum; *a*, front view frons and clypeus; *b*, profile vertex and frons.
6. *Tetraceratium wolcotti*, front view head; *a*, dorsal view head, pronotum and mesonotum.
7. *Ormenis pseudomarginata*, lateral view male genitalia without aedeagus; *a*, apex of anal segment; *b*, lateral view periandrium; *c*, lateral view penis.
8. *Petrusa pygmaea*, lateral view male genitalia without aedeagus; *a*, lateral view periandrium; *b*, lateral view penis.
9. *Flatoides brunneus*, lateral view male genitalia; *a*, ventral view genital styles.

whereas Melichar places it in the group with only one. The specimens have a distinct regular apical line, but only a very slight subapical line. The male genitalia are figured, and it is hoped that those having access to the type, or who have topotypes, will compare them and publish the results.

Flatoides brunneus sp. n. Plate XII, Figs. 9, a.

Male. Length, 3.5 mm.; tegmen, 4 mm.

In size, venation and general build this species is near to F. *punctata* (Walk.), but the vertex is slightly shorter and its apex a little more obtuse. The hind tibiae have three spines, one on basal and two on apical half. The costal area is wide at base and gradually narrows to apex, Sc arises from basal cell, R+M form a small stalk at base, Cu arises from basal cell, but becomes crowded out by M towards the apex of clavus; claval veins furcate near apex, enters the apex or the commissure near apex, clavus closed.

Dark brown; slightly darker over base of frons and mesonotum. Tegmina light brown, veins same color as membrane; wings very light brown with darker veins. A few very small dark specks on costal area and on corium.

The anal segment large with anus in middle, basal half tubular, slightly constricted at anus, apical half flattened horizontally with the apical margins slightly apical of anus produced into a large process on each side, with a smaller one arising between them from the ventral middle line of anal segment, apex in dorsal view rounded with a slight emargination in middle. Genital styles in ventral view subtriangular, longer than broad, touching on middle line of basal half; in lateral view the outer apical angle produced into a broad, curved spine with acute apex. Periandrium tubular with two pairs of spines at the ventral apical margin, one pair curved dorsad and the other pointing basad. The penis tubular on basal half and then bifurcate with two spines at apex.

Haina, Santo Domingo, R. D. (*G. N. Wolcott,* 1920), one male.

Type in U. S. National Museum, Washington.

The specimen of *F. punctata,* with which it has been compared, is from Florida, and was identified by Van Duzee. It appears to agree with descriptions of that species, but Melichar places it in *Cyarda.* If Van Duzee's and the author's identification be correct, then Melichar is wrong. The genitalia of *brunneus* and *punctata* are very close to one another and differ considerably from those of *Uxantes.* The three spines on the hind tibiae places this in the subgenus *Atracodes* Mel., but the number of these spines do not give a natural grouping.

PRESIDENTIAL ADDRESS.

Homoplasmy or Convergent Development in Evolution.

BY F. MUIR.

(Presented at the meeting of December 6, 1923.)

This meeting brings to an end the nineteenth year of our society, during which time we have held 216 meetings, thus only twelve meetings have been missed. This is a very good record for so small a society. The observations, captures, records, and descriptions, published in the twenty publications of nearly 2000 pages issued by our society, rank next to the Fauna Hawaiiensis in importance as contributions towards the knowledge of our insect fauna, and in regards to habits, life histories, and food plants, they are the chief storehouse of our knowledge. If our society had not been in existence during these nineteen years, few of these observations would have been placed on permanent record, and the loss to our science would have been great. The complete indices made for each of the four volumes so far completed have made the miscellaneous information scattered through our Proceedings easily accessible to future workers. Our small membership makes it impossible for us to publish our Proceedings upon the subscriptions and sales of our Proceedings, and the trustees of the Hawaiian Sugar Planters' Association have come to our assistance in a very generous manner. We all fully appreciate this help and trust that the good cause that they assist eventually comes back to them through the economic work which is made more possible with every increase in our knowledge of the fauna of the Islands. In no other group of tropical islands is the insect fauna so well known, the endemic insects so distinctly recognized from the later introductions, or the records of the later natural and artificial insect immigrants so fully observed and recorded, and in no other such group of islands has such knowledge been used to better advantage in the control of such insects as affect our economic plants.

To those of us who have been carrying on economic work along the lines of biological control, the following extract from a letter of the great French naturalist, Philibert Commerson,

written 150 years ago from Mauritius, is of deep interest, for not only did he foresee the possible economic use that could be made of introducing birds and other animals into Mauritius, but he also clearly recognized the principle of the balance of nature or the struggle for existence.

"It is a misfortune that we have not here any of those birds which destroy insect life. It is only this island that affords the spectacle of great forests without a single woodpecker. That is the great enemy of white ants, other ants, large and small caterpillars. What a service one would render the colony if one could but introduce robins, flycatchers, magpies, shrikes . . . and other insectivorous birds which never touch grain.

"Small hawks, owls, etc., could be imported to keep check on the multiplication of the smaller grain-eating birds; as well as snakes of a non-poisonous kind to destroy the rats. It would even be useful to bring frogs to purify the fresh-water pools, etc., of the swarming multitude of gnat-larvae which abound in them." *

This is a remarkable passage, and opens up a lot of interesting reflections as to where Commerson would have ended had he not died a comparatively young man, a martyr to his zeal for scientific research.

But it is not upon these subjects, interesting as they are, that I wish to speak today, but upon the very different one of:

Homoplasmy** or Convergent Development in Evolution.

This subject has formed the theme of many works, but I shall not touch upon its historic or bibliographic side, but I shall simply bring before your notice a few examples to show its universality in the animal world and suggest some of its bearings upon evolution.

In both the Protozoa and the Metazoa we find the same fundamental types of symmetry, i. e., radial, bilateral, spiral, leiotropic, dexiotropic, and modifications of these.† There are

* Life of Philibert Commerson, Pasfield Oliver (1909).

** Webster defines this word as: Resemblance between different plants and animals, in external shape, in general habits, or in particular organs, which is not due to descent from a common ancestor, but to similar surrounding circumstances.

† Kofoid, Nature, August 13, 1923, p. 253.

good reasons to believe that the Porifera or sponges (Parazoa) had a different origin from the Metazoa, the former from the Choanoflagellata and the latter from the Ciliata. Thus, it follows that multicellular animal organisms, with their attendant sexual method of reproduction, and the formation of ova and spermatozoa, has arisen at least twice independently of one another. The production of multicellular organisms was the most momentous step in animal evolution, and the fact that it occurred more than once in the animal world is of supreme significance.

In each great phylum illustrations of homoplasmy, or convergent or parallel development, can be found. The simplicity of the organization of Protozoa is not favorable to the recognition of such development, but students of those organisms could cite good examples.

Stephenson's * paper on Indian Oligochaeta is of great value from our standpoint, as he shows how parallel and convergent development has gone on in a number of genera, and he gives convincing evidence for polyphyly in some of them. I have contended for this in certain genera of Homoptera. This important paper should be consulted by all interested in this subject.

Many cases of homoplasmy could be cited from the Mollusca, but I will confine myself to those cases in which branchiae or gills are replaced by a lung or lung cavity. The animals included in the order Pulmonata all have a pulmonary sac. They are placed in two sub-orders, and are considered by many as having two distinct origins—the Basommatophora, originating from the Opisthobranchiata, sub-order Tectibranchiata, and the Stylommatophora from the sub-order Nudibranchiata. Most of the Prosobranchiata possess branchiae, but some possess pulmonary sacs; of the latter, some families (Cyclophoridae, Cyclostomatidae, Aciculidae) are placed in the sub-order Monotocardia, while others Helicinidae, Hydrocenidae, Proserpinidae are placed in the sub-order Diotocardia. Here we have four groups in which the branchiae have been replaced by lung cavities all having independent origin. Even if we disagree with the above

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*Pro. Zoo. Soc. Lond. 1921, pp. 103-142.

classification, we have to admit two origins, viz.: Operculata and Pulmonata, and then within each of these we have to admit convergence of characters upon which the above classification is based. Thus, if we consider the genera of Prosobranchiata, which have pulmonary sacs as forming a monophylogenetic group, we have to admit that they have acquired the one or two auricles independently. The reduction of the shell has taken place independently within the Pulmonata and the Opisthobranchiata, and in each case is accompanied by, and may be the direct result of, the reflected epipodia, which gives protection to the visceral mass.

In another class of Mollusca, the Cephalopoda, we find a very complex eye which, in certain important points, parallels the eye of mammals.

As example of homoplasmy among Crustacea, I cite the Monstrillidae, belonging to the order Copepoda and the Rhizocephala, belonging to the order Cirripedia. Here we have some of the most extraordinary cases of metamorphoses, due to parasitism, in the animal kingdom, and certain of the most remarkable features being paralleled in these two orders. Parasitism has taken place in many of the large groups of animals and has led to reduction of organs and simplification of organism, and numerous cases of homoplasmy can be found among them. Hermaphroditism is found in the Cirripedia, Isopoda, and Epicarida, and have been derived independently from dioecious ancestors. This condition has arisen sporadically in many groups of animals.

Among insects many instances could be cited. The Honorable N. C. Rothschild, in his presidential address to the Entomological Society of London in 1917, pointed out the marvelous cases of homoplasmy among insect ectoparasites. In these we find the development of ctenidia, the form flattened horizontally, the legs situated far apart and spreading, the claws often of peculiar form, their femora with pseudojoints, all in insects so far apart as Diptera, Coleoptera, Heteroptera, and Hemimeridae (Orthoptera sens lat.). His concluding remarks are interesting:

"From the various examples of resemblance I have mentioned, it is evident that the medium in which a species exists, exercises a most power-

ful influence on its evolution. If that is the case of Epizoic insects, we are not far wrong in assuming that the similarities, often slight in themselves, which sympatric insects (i. e., insects living in the same district) exhibit, are due in the first instance to similarity in the surrounding primary conditions of life." *

Among the Hymenoptera we have some most extraordinary examples of homoplasmy in wasps which inhabit figs. The true fig-wasps, or Agaonides, are wonderfully constructed for the life they lead, especially the male, which never leaves the fig, and passes its life among the forest of fig flowers; it is wingless, or nearly so, flattened horizontally, in many cases the middle legs are reduced or rudimentary, and the mandibles are large for gnawing open the galls containing the females; in fact, their whole morphology has been modified to adapt the insect to its activities within the fig. Other fig-inhabiting wasps belonging to quite different groups of genera, not taking any part in the polinization of the flowers, have males modified along similar lines. A thorough study of the fig-inhabiting wasps, their relationship and homoplasmy, would well repay a number of years' close study. If any of the figs bearing open fruit have gall wasps attached to them, their study should be included, as they should throw light upon the origin of the relationship of insect to fruit.

Wheeler, discussing certain ants, remarks:

"We have here some very interesting cases of convergence, or parallel development, since the underground habit has caused the workers, which rarely or never leave their burrows, to lose their deep pigmentation and become yellow or light brown and to become nearly or quite blind."

Among the Arthropods we find many that breathe by tracheae, i. e., Prototracheata, Myriapoda, Insecta, Arachnida, and perhaps even Isopoda. If the tubes in Isopoda are really tracheae, then these organs had at least two distinct origins, and even leaving these out of account it is highly probable that among the four other groups tracheae arose at least twice independently. Gills have arisen quite independently in many groups, and several times in a single class, such as insects, and even more than once in the same order.

* Pro. Ent. Soc. Lond. for 1916. September, 1917, cxli, clvi, and figs.

Among the Amphibia the Apoda, or limbless Amphibia, give an example of homoplasmy. Writing of these, Gadow remarks that:

"About forty species are known, these have been placed in seventeen genera, mostly on comparatively slight grounds, and several of these genera are probably unnatural, the distinctive characters having undoubtedly been developed independently in various countries." **

Among the lizards we find five families without limbs which have evidently lost them quite independently of one another. The burrowing snakes have a number of characters in common, but they have more than one origin.

According to many authorities, the birds are not descendants of the Dinosaurs, in spite of the many characters common to both. However striking these characters are, "they are instances of convergent analogies, the upright walk, which has been assumed and improved upon independently by members of both Theropoda and Orthopoda, has produced the same, or nearly the same modifications in them as in birds." *

Among the mammals we find the Metatheria or Marsupials and the Eutheria developing along independent lines, but reaching a number of very similar results. As an example, I quote the Marsupial mole (*Notoryctes*) and the Eutherian mole (*Talpa*) and its allies.

The Cetacea or whales, the Sirenia and the Carnivora Pinnipedia have traveled along the same lines of development independently, and the fossil reptile *Ichthyosaurus* has also traveled along the same lines, which is similar to the normal form of fishes, and apparently is the best adapted to life in the water. In these cases there are innumerable characters in morphology and anatomy which had to be modified to convert these land, or at most amphibious, animals into complete or nearly complete aquatic animals. Some birds have also taken to aquatic life and have been independently modified along lines to fit them for that element. Many insects belonging to different families have also been modified along lines adapting them for a life in the water.

** Camb. Nat. Hist. VIII, Amphibia and Reptiles, p. 89 (1901).

* Gadow, Camb. Nat. Hist. VIII, p. 416 (1901).

Flight, or the power of moving through the air for some considerable distance, has been acquired by animals in different classes, such as fishes, lizards, birds, and mammals. In the case of birds and bats, although the details differ, yet the conversion of the front limbs into organs of flight have been paralleled.

Nearly all the examples cited above are functional homoplasmy, or adaptations of certain organs for certain uses, and it is of great interest to note that the great majority of the most conspicuous cases of homoplasmy are of that nature, for it shows very forcibly the direct or indirect influence of the environment upon the organism.

But there are innumerable cases of homoplasmy in which it is difficult to connect any functional use. Such are well known to any systematist who has worked at a large group and has attempted to draw conclusions as to their relationship. Every entomologist could cite innumerable examples, so I will only refer to a few of those which I find in the group which I have paid most attention to, and recently published upon, namely, the fulgorid Homoptera.

In fulgorids we find a vein in the fore-wing, which is generally considered as the costa. In many forms, including what I consider to be the most primitive, we find this vein coincident with the costal margin, but in others it is some distance from the margin and thus forms a precostal cell or "costal area" which is often crossed by a number of veins. This condition has arisen at least twice among the fulgorids and most likely several times. The amalgamation of the basal portion of the veins has taken place many times quite independently, even within a single family; the commonest is the amalgamation of the subcosta and radius, but the radius and media have also amalgamated together; and also the subcosta, radius, and media. The clavus is normally closed, but in more than one family (i. e., Derbidae, Flatidae, and Fulgoridae) it is found to be open in some genera. Among the Flatidae there are some genera in which the claval veins do not form a fork, a condition peculiar to the Cicadoidea. The arrangements of the branching of the veins and the conditions of the cross-veins are paralleled many times in the superfamily. The reduction of wings in the superfamily has taken place many times quite independently. Another character used

in classifying these insects is the condition of the carinae on the frons, whether there be one simple carina, or if it be forked, or if there be two. These conditions are found quite independent of one another in different families and in groups in the same family. The condition of the antennae is also used in some families, and here again there is no phylogenetic connection between those having large, flattened antennae, as they are found in more than one group of a single family (i. e., Delphacidae). In the Derbidae we find the sub-antennal process and shoulder keels developing quite independently, and the latter forming a large antennal chamber in widely separated genera. It may be objected that the present classification of these families is not "natural," and hence the apparent homoplasmy, but in whatever sequence or order these genera may be placed, cases of homoplasmy will be found.

This condition is not peculiar to the fulgorids, but is found in every group of insects of moderate size which one studies. Timberlake, in discussing a single family of Hymenoptera, the Encyrtidae, remarks:

"The bewildering plasticity of the group whereby the same character may have been developed independently in different genera (as, for instance, the fascicle of hairs at the apex of the scutellum in *Encyrtus*, *Cheiloneurus*, and *Chrysoplatycerus*.)"*

These few cases of homoplasmy, out of vast numbers which could be cited, have not been brought to your notice out of idle curiosity, but because I believe that they are important evidence in the one great problem which should be at the back of all zoological studies, viz., evolution.

Although I appreciate and admire the vast amount of experimental zoology that has been done within recent time, yet, when it is all considered, it does not give direct or indirect evidence enough to base a belief in evolution upon. This belief is based upon nature's own experiments, upon our studies of development, comparative morphology and anatomy of living and fossil animals, upon the geographic distribution in past and present time, and the time sequence as shown by fossils. Most of this information is the direct result of systematic zoology. If all

* Timberlake, Proc. Ent. Soc. Wash. 25 (3), p. 58 (1923).

this evidence was wiped out, the evidence founded upon experimental zoology would not prevent William Jennings Bryan from expunging the teaching of evolution from American schools. Yet we are constantly being told that systematic work is only worthy of inferior intellects, and that great intellects turn their attention to genes or tropisms, or other superior subjects.

The fact that animals have adapted themselves so wonderfully to their environment, independently arriving at similar resuts on more than one occasion, would make one believe that Lowell's famous lines:

> "Some flossifers think that a fakkilty's granted the minnit its proved to be thoroughly wanted."

contain more truth than sarcasm.

Everyone who studies the subject must admit that adaptation runs through the whole animal kingdom, and most will admit the frequency of homoplasmy. Nearly every zoologist who believes in evolution will also admit that the environment, in its widest sense, has been the great "potter's thumb," moulding the organisms in form and habit. The great rift comes when biologists begin to discuss the manner in which this moulding has taken place. This has divided them into two great camps, one following Weismann and the other Lamarck.

Weismann contended that the germ plasm passed from generation to generation continuously, without a break, absolutely uninfluenced by the body cells or soma. Thus, any influence which the environment might have upon the soma could not be impressed upon the germ plasm. As the soma arises from the germ plasm at each generation, it follows that the only means by which heritable variation can arise is by an alteration of the germ plasm. While Weismann considered that the environment might produce modifications of the germ plasm similar to that produced on the soma (parallel modification) many of his followers do not admit this, but maintain that the germ plasm cannot be influenced by the environment either directly or indirectly. According to this extreme school, all variation arises through the mixing and sorting out of the genes during the mating of the sperm and egg. In this kaleidoscopic shifting of

the genes, or particles of the chromosomes, the chances of the combinations of characters that are necessary arising in the necessary consecutive order, without any inimical combinations, are so enormous that one's faith falters, and one turns to seek a solution which requires a smaller draft upon our credulity. That similar sequences should have occurred two, three, or more times quite independently is still harder to believe. This has been aptly called the "lucky throw of the Mendelian dice," but the dice are not six-sided, but very many-sided, and many sides bear death upon their face, and others bear indifference, and among the remainder only certain sequences are allowable, and the banker is Death and Oblivion.

But even to those whose faith is greater than mine there are other obstacles. While there is a large amount of negative evidence to support Weismann, there is also some positive evidence which is against him. That the continuity of the germ plasm is not so universal as he thought, is evident from work such as Gatenby's on the formation of new egg cells during sexual maturity in frogs. Kammerer's work cannot be ignored by his opponents, and the work of Guyer and Smith on the eyes of rabbits is a strong point against him. The more recent work of Garrett and Harrison on melanism among British moths is of great interest, for here we find that melanism caused by certain metal salts is inherited, and follows the Mendelian law.*

Turning to the other school of thought, we find few today who hold the crude views of a past generation. Early in the development of animal life a mechanism must have been developed to guard against individual mutilations becoming incorporated into the race, otherwise we should have nothing but maimed and helpless races of animals.

Fortunately, we have a few leaders who can see the virtues and vices of both of these extreme schools of thought, and who are combining the best in each into a more workable theory. In the study of the development of the phylum, as well as the individual, the great task is to discover the mechanism by which similar cells develop into totally different organs, having vastly

* Melanism in the Lepidoptera and its Possible Induction, Nature, August, 1923, p. 240. See, also, Nature, September 16, 1922, p. 380.

different functions and shapes. This cannot be due to the chromosomes and genes, for all the cells are equally endowed, but it must be due to forces external to these chromosomes, by which some of the latent capacities of growth are suppressed, while others are encouraged. Some light is being thrown upon this most interesting problem by recent discoveries in cell activities and harmones, and in the harmonic relationship of various parts of an organism. This most important and fascinating subject is but in its infancy, but already it appears to have thrown some little light upon Lamarckian factors and the inheritance of acquired characters. The post-pituitary harmone is responsible for the change of color in the skin of the frog which is of a protective nature, and, if we accept Kammerer's experiments, individuals born of parents that have lived in dark or light surroundings are correspondingly light or dark, which most likely is caused by the influence of the harmones on the germ plasm. Guyer and Smith's experiments on the eyes of rabbits may also be due to similar influences. Along this line of thought we may eventually find the mechanism by which we can understand, to some extent, the effect of use and disuse upon the organism. But we must co-ordinate the studies of form, function and development, or morphology, physiology and embryology.

This subject also has direct bearing upon the subject of this address, viz., Homoplasmy, for if environment in its widest meaning can affect certain organs or characters in one animal it is likely to do so in many others. The reduction of eyes in cave-dwelling animals may then be due to the absence of stimuli and not to "chance throws of the Mendelian dice"; and if we admit the possibility or probability of this, then the reduction of organs in parasitic animals may also be due to the absence of stimuli. And then it is not a long step to the production of similar characters in different animals living under similar conditions. That they do develop such is common knowledge. The question at present at issue is whether this is due to harmonic relationship between the animal and its environment or to "chance throws of the Mendelian dice."

Immigrant Records for 1923.

BY THE EDITOR.

The following immigrant insects are recorded for the first time, in this publication. Some have been known or collected previously, but remained undetermined or unrecorded. Those marked with an asterisk (*) were observed or collected for the first time during the year, and hence considered as rather recent arrivals. Those marked (**) were observed for the first time early in 1924, and are included here as they are listed in a paper that was finished in the latter year. For details of records, etc., refer to the pages given.

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